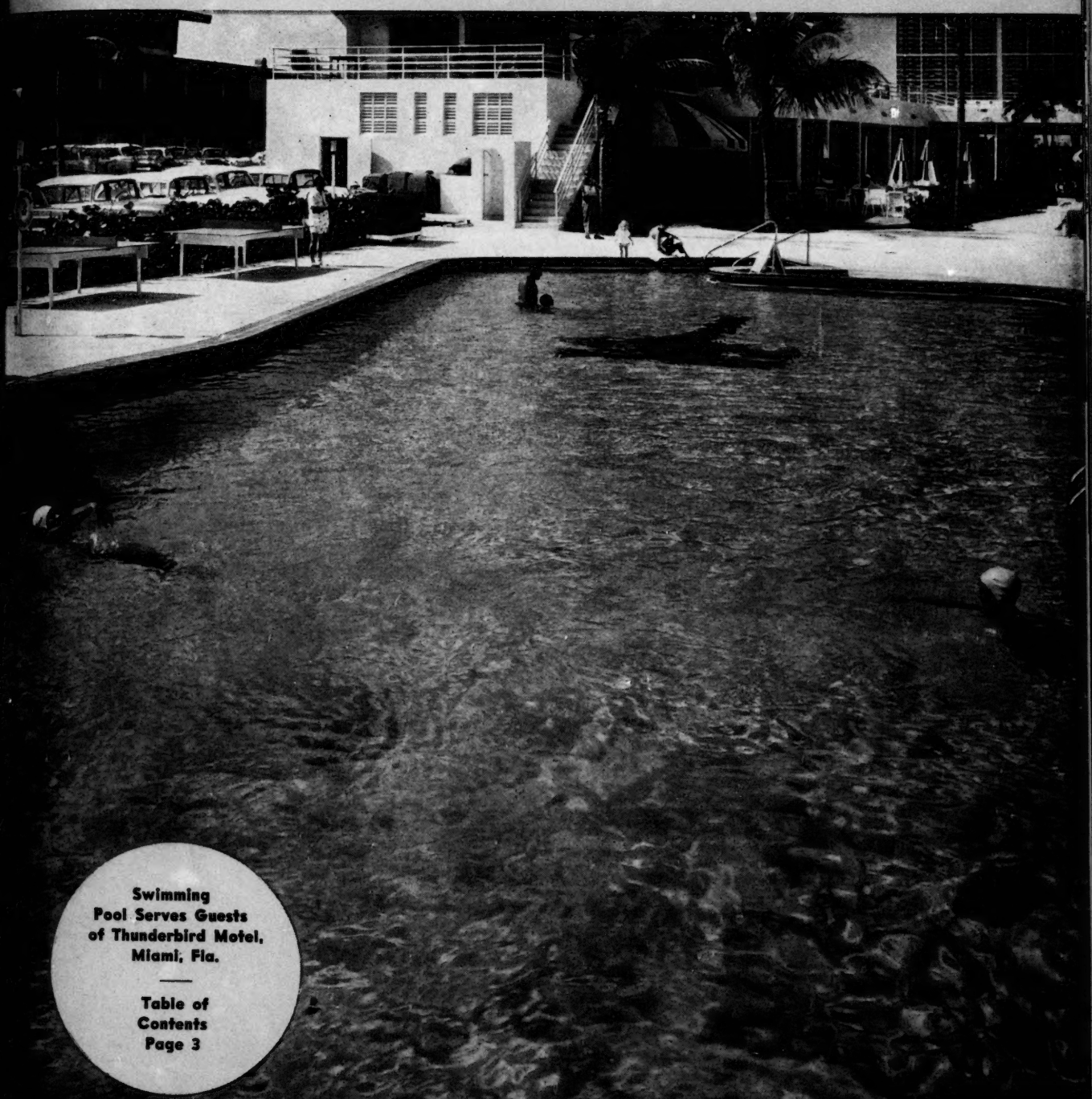
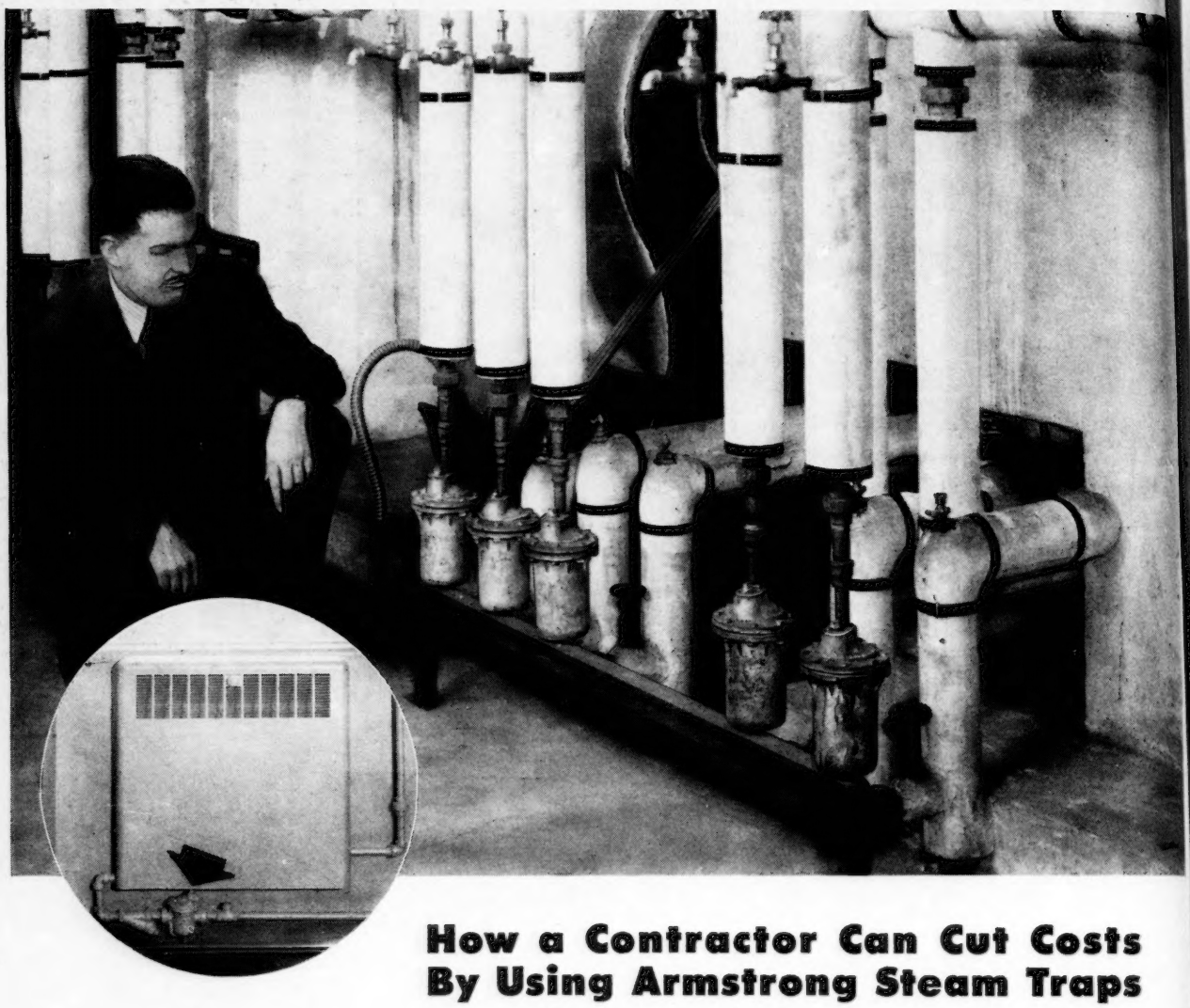
AIR CONDITIONING HEATING AND VENTILATING

FEBRUARY, 1957—54th Year



Swimming Pool Serves Guests of Thunderbird Motel, Miami, Fla.

Table of Contents Page 3



How a Contractor Can Cut Costs By Using Armstrong Steam Traps

● There is more than meets the eye in steam traps. If you don't regularly specify Armstrongs, you ought to know about these cost factors:

1. First Cost. The size and, hence, price of a trap is determined by its capacity. The high capacity of each Armstrong trap often enables you to select a size smaller than you would otherwise use.

2. Installation Cost.

Connections. Armstrong offers you a choice of straight-through horizontal or vertical connections, as well as a right angle trap, to save fittings and labor.

Strainers—seldom needed because ordinary dirt and scale won't plug up an Armstrong. When strainers are desirable, Armstrong offers built-in strainer traps that cost less to buy and install than separate traps and strainers.

Check Valves. Here again, Armstrong offers a cost saving with a stainless steel, spring loaded internal check valve that is superior to external check valves.

3. Call-Back Cost. When you put in Armstrong traps, the job is done. The traps will work without attention, not just for a month or two or even a year, but *more commonly 3 or 4 or 5 years!* No traps have so enviable a record for low maintenance as Armstrongs because the mechanisms in low pressure traps are identical in design, workmanship and materials to those used in traps for 900 lbs. pressure, 900°F temperature.

Get the figures and the facts. Call your local factory-trained Armstrong Representative or write:

ARMSTRONG MACHINE WORKS
8462 MAPLE ST., THREE RIVERS, MICHIGAN

How to Select and Install Steam Traps for Lowest Cost:

Here are two pieces of useful literature you should have—free on request:

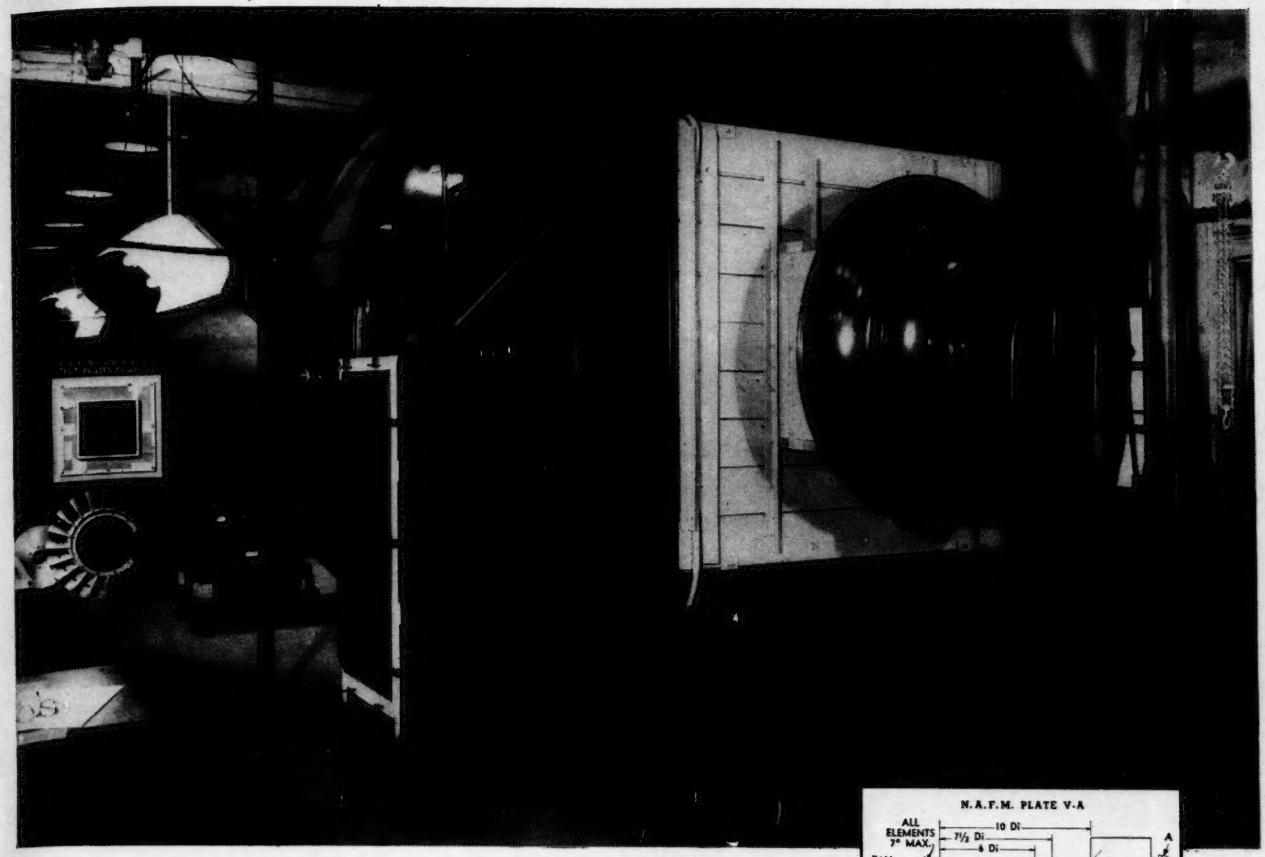
1. Armstrong Steam Trap Book—44 pages of trap data, tables, hookup diagrams and selection information.

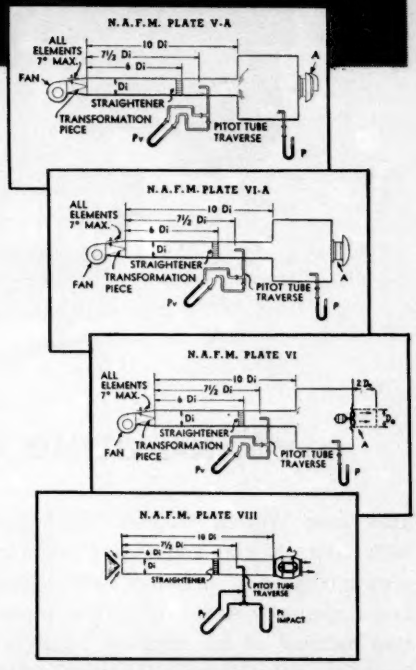
2. Unit Heater Trapping—trap selection and installation plus BTU output tables for every model of 30 makes of unit heaters.

UNCONDITIONALLY GUARANTEED TO SATISFY THE USER

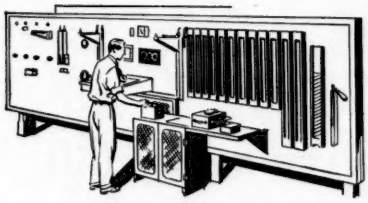
APPLICATION ENGINEERED

ARMSTRONG STEAM TRAPS





DeBothezat cfm ratings are CERTIFIED ... no guesswork when you select fans



Here's why you can select a DeBothezat fan by its exact catalog rating — without making any allowance "to be on the safe side." Thanks to DeBothezat's advanced testing facilities, all cfm ratings are *certified*. Right in the DeBothezat plant, accurate wind tunnel tests are made in accordance with the appropriate NAFM plate . . . and conform to U. S. Dept. of Commerce standard 178-51. So a DeBothezat rating is what the complete fan unit actually puts out. Send for Free 8-page bulletin entitled: "Certified Air Moving Equipment." Address Department HV-257.

De Bothezat FANS

A DIVISION OF

American Machine and Metals, Inc.

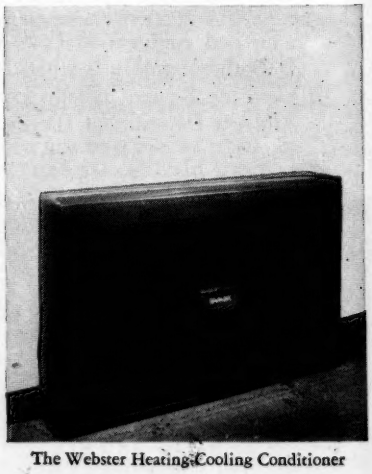
EAST MOLINE, ILLINOIS

YEAR-ROUND COMFORT BEGINS WITH THIS MAN

He's your Warren Webster Man! And with him, heating-and-cooling comfort always comes first, in homes both modern and modernized. At the right is one important member of his complete family of products — the Webster Heating-Cooling Conditioner.

Here, hot water heating is teamed with chilled water air conditioning in a single central system, without ductwork or window obstruction. Compact, quiet conditioners put comfort at your finger tips . . . individual room controls. Time-tested and performance-proved, it spreads uninterrupted year-long comfort. And every installation is backed by the skill and integrity of Webster's Finest Product — the Warren Webster Man. Call him today for the exciting details.

Warren Webster & Company, Camden 5, New Jersey. Since 1888. Offices in 66 principal U.S. cities and Canada.



The Webster Heating-Cooling Conditioner

Webster's Finest Product . . . the Warren Webster Man

WARREN WEBSTER

HEATING . . . COOLING

AIR CONDITIONING HEATING AND VENTILATING

FEBRUARY, 1957

Editorial Staff

Editor
CLIFFORD STROCK

Associate Editor
NATHAN N. WOLPERT

Assistant Editors
HAROLD M. ENGLUND
RICHARD L. KORAL

Published by
THE INDUSTRIAL PRESS

Executive, Editorial and Subscription Offices,
93 Worth St.,
New York 13, N. Y.
CA. 6-8120

CONTENTS

VOL. 54 No. 2

FEATURE ARTICLES

A Scientific Approach to Military Plumbing Fixture Requirements—H. Graus 93
Outside Steam Distribution Lines Serve Parris Island—H. B. Swygert, Jr. 97
Calculating the Heat Requirements of a Snow Melting System—Part 6—W. P. Chapman 101
Abner and the Unseen Forces—E. J. Updraft 106
Chemicals, Cooling Water Provide Comfort Conditioning—L. Hamm 109
Exhibitors and Diagram, 13th Heating & Air-Conditioning Exposition 129

SHORT ARTICLES

Resort Supermarket Needs Better-than-Average Air Conditioning 96
Air Conditioning of Factories Is a Must 105
Railroading Problems Are Shocking 124
Air Pollution in Great Britain from the Use of Fuels 141

REFERENCE MATERIAL

Data Sheet—Superheat Data—Freon-12; Pressure-Enthalpy Chart-Freon-12 99
Detail Sheet—Gravity Water Supply Tank System 111
Section—Design of Swimming Pools—G. R. Jerus 113

DEPARTMENTS

High Spots 5
Washington Overtones—L. Overman 6
Briefly Stated 10
Ad-Digest 125
Piping and Plumbing—L. Blendermann 138
Product Applications 142
Degree-Days for December, 1956 ... 144
News of Equipment and Materials ... 148
News of the Month 176
New Catalogs 178
Canadian Degree-Days for November and December, 1956 198
Coming Events 198
Index to Advertisers 208

The Cover: Outdoor swimming pool provides recreation for the guests of the Thunderbird Motel, Miami, Fla. For details of swimming pool design, see page 113. Photograph, courtesy of Wallace & Tiernan, Inc., Belleville, N. J.

AIR CONDITIONING, HEATING AND VENTILATING, published monthly by The Industrial Press, 93 Worth St., New York 13, N. Y. Executive, editorial and subscription offices, 93 Worth St., New York 13, N. Y. Entered as second-class matter, August 31, 1956, at the Post Office, East Stroudsburg, Pa., under Act of March 3, 1879.

Subscription Rates: In the United States and Canada, one year, $3; two years, $5; three years, $6; in all other countries, one year, $7; two year, $11. Single copies, 30 cents.

Copyright: Copyright, 1957, by The Industrial Press, New York, N. Y. Permission required to reproduce articles.

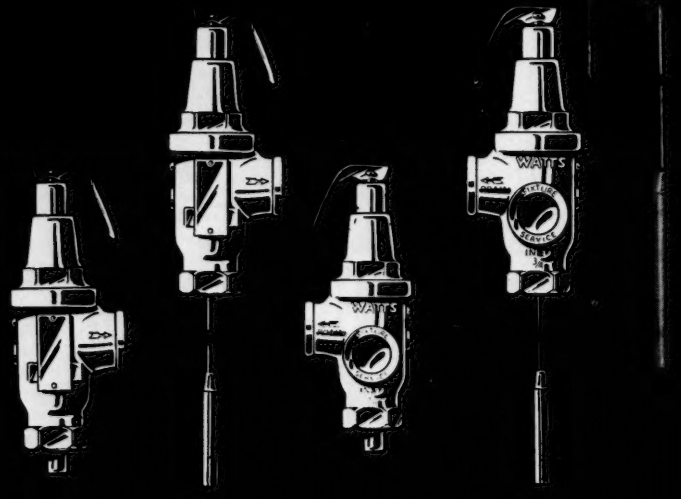
Member of National Business Publications, Business Publications Audit, Society of Business Magazine Editors.

Executive Officers, The Industrial Press: President, Robert B. Luchars; Vice-President and Treasurer, Edgar A. Becker; Secretary and Publishing Manager, Harold L. Gray.

Advertising Representatives: George G. Turner, 228 N. La Salle St., Chicago 1, Ill.; Harry J. Twine, 93 Worth St., New York 13, N. Y.; George W. Miller, 93 Worth St., New York 13, N. Y.; Edward B. McEntee, 17115 Hillsboro Rd., Cleveland 12, Ohio; Robert H. Deibler, 1800 W. 6th St., Los Angeles 57, and 220 Montgomery St., San Francisco 4, Calif.; Richard E. Hoierman, 2831 El Capitan St., Dallas 28, Tex.; Fred W. Smith, 1212 41st St., Belview Heights, Birmingham 8, Ala.

Indexing and Microfilm: Contents of AIR CONDITIONING, HEATING AND VENTILATING are indexed monthly by Industrial Arts Index and microfilmed by University Microfilms, Ann Arbor, Mich.

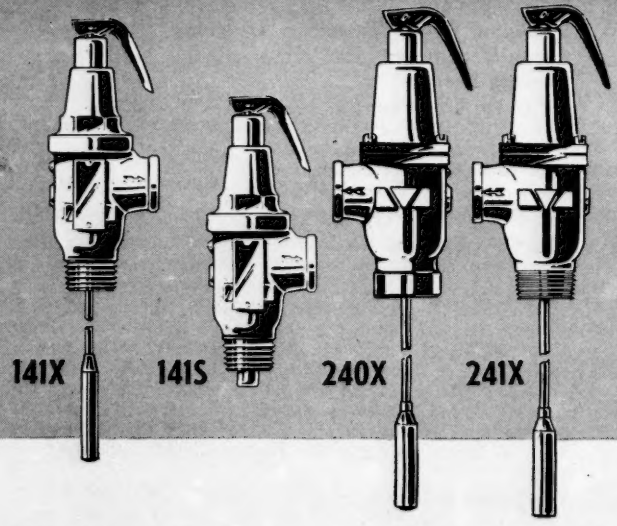
NEW



WATTS

N40L & N40XL ¾" male inlet (ASME rated)

The N40L & N40XL, shown, provide a ¾" male inlet relief valve equal in capacity to the 140 Series. This allows for greater versatility of inlet connection styles in this popular range. Together the N40 and 140-240 Series comprise a most complete line of ASME Rated T&P Relief Valves for the protection of hot water supply tanks and heaters.



Type No.	Connections Inlet	Drain	Fixture	Style Thermostat	AGA Temperature Water Rating BTU/HR	ASME Pressure Steam Rating BTU/HR (Valve set at 125 lbs.)
N40L	¾"m	¾"f		Short	850,000	1,028,000
N40XL	¾"m	¾"f		Extension	850,000	1,028,000
140S	¾"f	¾"f		Short	850,000	1,028,000
140SF	¾"f	¾"f	¾"f	Short	850,000	1,028,000
140X	¾"f	¾"f		Extension	850,000	1,028,000
140XF	¾"f	¾"f	¾"f	Extension	850,000	1,028,000
141S	1"m	¾"f		Short	850,000	1,028,000
141X	1"m	¾"f		Extension	850,000	1,028,000
240X	1"f	1"f		Extension	1,125,000	1,467,000
241X	1¼"m	1"f		Extension	1,125,000	1,467,000

(f) female connection — (m) male connection

WATTS

Manufacturers of – The Largest and Most Complete Line of Plumbing & Heating Safety Valves and Controls

REGULATOR COMPANY
LAWRENCE, MASSACHUSETTS

HIGH SPOTS

• Normal **increase in employee efficiency** due to year-round **air conditioning** of business organizations is 20 to 30%, according to E. H. Norling, Air Conditioning Div., General Electric Co., Bloomfield, N. J. Data, gleaned from hundreds of case histories, were presented before a forum of industrialists, Jan. 17, co-sponsored by the company and Public Service Electric and Gas Company of New Jersey. Estimating conservatively, he said, air conditioning should give the manufacturer a bonus of one extra hour of work per employee for each hot, humid day that requires air conditioning. For more on speech, see page 105.

• A total of eighty-five papers will be presented at the annual American Power Conference scheduled for Chicago, March 27-29.

• Ten manufacturers of **room coolers** have already completely complied with the Air-Conditioning and Refrigeration Institute **standard for rating** such units in Btus. See News of the Month, starting on page 176.

• The Journal of Solar Energy Science and Engineering commenced publication with its January, 1957, issue. It is published by The Association for Applied Solar Energy, Phoenix, Ariz., under Editor Jean Jensen. Annual subscription is ten dollars. Next issue is April.

• Production of **soft coal** will jump over 20% this year, according to industry leaders. Increased demand for electric power will account for the bulk of the rise.

• A testing and rating **code for chilled water fan coil units** is being developed by a committee of I-B-R. See News of the Month, starting on page 176.

• The Gordon Research Conferences have proved the value of professional bull sessions. This summer, reports Industrial Bulletin of Arthur D. Little, Inc., Cambridge, Mass., when the conferences convened for the twenty-fifth time, more than 3,000 scientists were given the opportunity to meet and talk shop with the best minds in their fields. Professional stimulation in the fields of chemistry, physics, biology, statistics, medicine, atomics, metallurgy, engineering, etc., is achieved, though proceedings of a conference are never reported, its statements quoted, or its papers published.

• A **scholarship plan** that trains technicians to free graduate engineers for more important work is announced by The Trane Company. See page 176.

• Additional parts of the **Standard Building Code of New Jersey** have been adopted. Municipalities have option to adopt. Part D includes air conditioning, mechanical ventilation, and refrigeration. See News of the Month, starting on page 176.

• The New York City Council has voted a **new electrical code** requiring that all new construction built for human occupancy, and all remodeled buildings, shall have electrical **wiring sufficient to handle air conditioning equipment.** In addition to air conditioning, the code requires provision for an electric broiler, toaster, iron, skillet, fan, waffle iron, and refrigerator. The City's Department of Water Supply. Gas, and Electricity estimates an increase of 30% in the cost of new wiring as a result of the code change.

• England's false sense of security in regard to fuel supplies has been "rudely shattered" by events in the Middle East, according to the Editor of The Industrial Heating Engineer, Air Conditioning and Ventilation, London. A cut of 10% in all fuel oil supplies is imposed. Normal supplies may not be resumed for a year. To save fuel, Editor suggests that **overheating of industrial plants be avoided.** With an outside temperature of 40 deg F, he points out, 5% more fuel is required to maintain factory temperature at 61 deg rather than 60 deg. With outside temperature of 50 deg, 10% more fuel is required.

WASHINGTON OVERTONES

by LORING OVERMAN

Principal originator of Washington Overtones during January was the **President's budget message** to the new 85th Congress. Proposing the largest government expenditures during peacetime, the budget sets the pattern for Congressional action.

Likewise, the 71.6 billion dollar program of government expenditures during fiscal 1958 provides a roadmap for other phases of the economy. Examples:

- Defense is assigned 63% of the total, or $45.3 billion.
- Civil benefits will claim 24%, or $16.9 billion.
- Interest alone claims 10%, or $7.4 billion.
- Civil operations, administration and contingency will share 3% of the budget, or $2.2 billion.

Paradox. One of the curious features about the outsize budget is that it promises **a slight surplus.** Not enough to justify a tax cut, of course; just enough to justify the label, "a balanced budget". Estimated receipts for fiscal '58 total $73.6 billion, indicating a $1.8 billion surplus if the $71.8 billion expenditures are approved by Congress.

Tax Pattern. Announcement of the new budget confirms previous indication that the Administration would recommend **no general tax** cut this year. Even the tax reductions scheduled to become effective on April 1, 1957, are recommended for continuation. Included is the 52% corporate income tax rate (scheduled to drop to 47% come April), and present excise tax rates on tobacco, liquor and automobiles. The President, in his budget message, recommended specifically that these taxes be continued.

Small Business. Small business will most likely come nearest to a tax cut. Many Washington observers feel, however, that emphasis on relief for small business involves more smoke than fire. President's recommendation was that some consideration be given to tax relief for small business if it entails a minimum loss of revenue (to the Treasury). "Any changes involving substantial loss of revenue should be considered at a later time when a general tax reduction is possible," he cautioned.

A **Cabinet Tax Committee** recommendation for small business, referred to by the President, proposed:

- That taxes imposed on business corporations be modified by reducing the tax rate from 30 to 20% on incomes up to $25,000;
- That purchasers of used property (not exceeding $50,000 in any one year), be permitted to use the same formulas of accelerated depreciation made available to purchasers of used machinery under the Internal Revenue Code of 1954:
- That corporations having few stockholders (10 or fewer), be given the option of being taxed as if they were partnerships.
- That the taxpayer be given the option of paying an estate tax over a period of 10 years in cases where the estate consists largely of investments in closely-held business concerns.

Foregoing recommendations are estimated as representing $600 million annual loss of revenue, with $400 million of this amount to come from the promised changes in the corporate tax structure.

Tax Outlook, 1959. With hopes for an immediate tax cut fading, Treasury Secretary George M. Humphrey advised a press conference group to start working now toward **a real cut in fiscal '59.** Required for such a cut, he said, would be:

- Full cooperation of the public in limiting its demands upon the Federal Government;
- Support of Congress to restrict appropriation of public money amounts recommended in the budget;

(Concluded on page 8)

76 Quarts of Actual Water

Permeate the Average Home EACH WEEK...

. . in the form of 152 lbs. of WATER VAPOR

Here's the breakdown for a family of 4 per week

	VAPOR
Breathing and Perspiring (2 oz. per person per hr.)	51.0 lbs.
Showers (½ lb. per bath)	14.0 lbs.
Washing Clothes	4.3 lbs.
Drying Clothes Indoors	26.0 lbs.
Cooking (Gas) (4.7 lbs. daily)	32.9 lbs.
Ordinary Dish Washing (1 lb. daily, automatic much more)	6.0 lbs.
Mopping (100 sq. ft. daily, 3 lbs.)	18.0 lbs.
TOTAL WEEKLY VAPOR	152.2 lbs. or 76 quarts

In addition, each 1,000 sq. ft. of soil under a building may produce 96 lbs. of water vapor DAILY.

NO WONDER TIMBER ROTS — PAINT PEELS — PLASTER CRUMBLES — STEEL BEAMS RUST!

Because vapor has slight density, about 1/205,000th the density of water at 32°F and 1 millionth at zero degree F., it passes through brick, stone, plaster, etc. Most building materials, even asphalt paper, are *porous* to vapor.

When vapor meets a cold front inside walls and ceilings and reaches a dew-point, it condenses. This destructive "fall-out" (condensation), stimulates the growth of the ever-present microscopic spores of fungi in timber that cause dry-rot. Paint peels! Plaster cracks! Masonry crumbles! Iron rusts! Destructive condensation cost over a MILLION DOLLARS in repair bills to one apartment development alone!

Metals are the best vapor barriers because they have almost ZERO vapor permeability. Multiple layers of aluminum interspersed with air spaces, also scientifically minimize condensation formation on or within them; as well as the flow of heat by radiation, convection, and conduction.

When multiple sheets of aluminum stretch parallel all the way from joist to joist, they insulate the entire area with full-depth, *uniform* protection.

Such insulation is available commercially in *continuous* pre-fabricated lengths of 375 to 750 ft. It is installed in ceilings, walls, floors and crawl spaces; between wood beams and studs, steel girders and trusses.

The U. S. National Bureau of Standards has published an informative booklet describing the destruction that condensation can cause, and means of its prevention. It is entitled "Moisture Condensation in Building Walls". Send us the coupon for a FREE copy.

THERMAL VALUES, INFRA TYPE 4S

Up-Heat C .105 = 3⅛" non-metallic insulation*
Wall-Heat C .068 = 4¾" non-metallic insulation*
Down-Heat C .042 = 7⅞" non-metallic insulation*

*Based on limiting values of Fed. Spec. HH-I-521c

Cost installed between wood joists, material and labor, about 8¢ sq. ft.

Type 6 also available

Can be purchased everywhere through your preferred local dealer.

Infra Insulation, Inc., 525 Bway., N. Y. C. Dept. V-2
Send "Moisture Condensation in Building Walls."

Name_____

Firm_____

Address_____

WASHINGTON OVERTONES *(Concluded from page 6)*

● Vigorous measures on the part of every Government Department and Agency to search out additional ways to save money and manpower, and to see that actual expenditures are kept within the budget.

● Attention, in planning the 1959 budget, to further reductions which would not lessen security or necessary services to the public.

"If this program is adopted and resolutely followed," said Mr. Humphrey, "we can, a year hence, give consideration not only to some further payment on the public debt, but also to **further tax reductions.**"

Budget and Construction. What the budget outline will do to (or for) housing and construction generally remains to be seen. The answers will be of cash-register interest to members of the air-conditioning heating and ventilating industry.

The President's message **suggested an increase** to 5% from the 4½% limit now fixed by law **on home loans** guaranteed by the Veterans Administration. A corresponding increase in the interest rate paid by Veterans on direct GI housing loans was also suggested. Another move to bring out mortgage money needed for home construction would permit the Federal National Mortgage Association to expand by approximately $2 billion the amount of mortgages it can buy from banks and other lenders.

. . Other **construction programs** for which budget provision is made:

● By 1958, a total of 572 federally-assisted slum clearance projects will be under way, at total cost of 2.5 billion dollars. Federal capital grants will approximate 1.2 billion. To underwrite Federal share of this program, the budget includes items of 250 million dollars a year for two years.

● **College housing** requirements (dormitories and related facilities) continue to rise. Budget asks additional borrowing authority of 175 million dollars a year to continue present commitment level of 250 million dollars yearly for such facilities.

● Aid for **school construction,** over a four year period, is also contemplated in the new budget. The program is a contraction of the five-year program proposed in the 84th Congress. Budget contains an item of 451 million dollars for the first year's operation under the proposed legislation. Through current financing means—some shared by Federal funds in areas where school population has been unduly increased because of government activities—69,000 classroom facilities are expected to be built in the 1956-57 school year.

Price Rises in gasoline and heating oils are attracting the interest of Congressional investigators. NC Senator W. Kerr Scott, commenting on recent increases, observed, "It may well be that new legislation is needed to put a curb on such arbitrary action by a whole industry. At least the public should have the facts." Senator Joseph C. O'Mahoney (D-Wyo.) is also intrigued, particularly by activities of MEEC, the Middle East Emergency Committee. MEEC is a 15-member group of U. S. oil companies authorized last November to act jointly to ease Western Europe's need for oil.

There'll be **atom-generated power** in abundance if the 85th Congress has its way. In both Senate and House, several bills have been introduced to encourage civilian construction of fullscale facilities to produce electric power. S52, sponsored by Clinton Anderson (D-NM) vice-chairman of the Joint Atomic Energy Commission, would authorize a $500 million program of federal indemnities against injuries resulting from "reactor incidents". The federal insurance would become effective at a point where existing private insurance is exhausted.

Aluminum as a substitute for construction materials now employing other metals is being studied by producers as a result of reduced demand for aluminum airplane parts. Possible applications in the air-conditioning, heating and plumbing fields are being explored.

To keep corrosion from "calling collect"—
Pacific Telephone & Telegraph Company used Wrought Iron Pipe

This radiant heating system, serving 22,500 square feet of floor area in Pacific Telephone & Telegraph Company's new warehouse at San Leandro, California, is an excellent example of the Company's insistence on durability. More than 16,300 feet of corrosion-resistant wrought iron pipe was used to safeguard the system against premature failure and costly repair.

The system, planned and designed by PT&T's Engineering Department, features some interesting construction details employed to protect the floor against damage from heavy fork-lift trucks and impact caused by bouncing reels of cable. After the 10-inch structural slab was poured, wrought iron pipe coils were laid in place. Over the pipe coils, a wire mesh was stretched to strengthen the concrete "topping" slab, and contribute to more even heat distribution. Then the pipe and mesh were covered with 3 inches of concrete. A metallic floor hardener was applied to the surface.

Architects for the project were Thomsen & Wilson, San Francisco. The system was designed by Harry S. Haley, San Francisco Consulting Engineer, in collaboration with Pacific Telephone & Telegraph Company engineers. The installation was made by Scott Co., Bay Area Mechanical Contractors.

Wrought iron pipe is ideally suited for this service because of its ease of installation, dependability in service. It takes short radius bends, without springback. It produces sound welds, free from pin-hole leaks. Its uniform structure assures sharp, full-depth threads. And because of its mechanical strength, wrought iron pipe withstands damage during installation. In service, wrought iron stays on the job longer, costs less per year.

Our bulletin, *Wrought Iron Pipe for Radiant Heating*, gives complete details, documents service records. Write for a copy.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. International Division: New York, N. Y.

Available throughout the world

BYERS *Wrought Iron Tubular and Hot Rolled Products*

ALSO ELECTRIC FURNACE QUALITY STEEL PRODUCTS

BRIEFLY STATED

• **Deane Worlein** is appointed manager of York-Detroit Wholesalers, a subsidiary of Borg-Warner Corp., Detroit, Mich. He will direct the distribution of York air conditioning, heating, refrigeration and ice maker products throughout the lower portion of Michigan.

• **J. R. Matullo** has been appointed district manager of Worthington Corporation's new Newark District Office, which was established January 1. Mr. Matullo had been serving as a general line salesman since joining Worthington in 1934 until his appointment last September as manager of the New Jersey Branch Office.

• Appointment of **Dr. B. D. Thomas** as director of Battelle Memorial Institute, Columbus, Ohio, was announced by Dr. Clyde Williams, president and former director. A member of the Institute's technical staff since 1934, Dr. Thomas' scientific interests are reflected in his papers on the technology of iron ore, the chemistry of sea water, and on separating, sorting, and concentrating of minerals.

• **Anemostat Corporation of America,** New York, N. Y., announced the acquisition of a substantial interest in **Waterloo Register Co.,** Inc., Waterloo, Iowa, a manufacturer of registers and grilles since 1902. The companies will operate individually as before, but will collaborate on research, engineering, and marketing.

• Formation of **Taitco,** a new division to market a line of industrial products, now being developed, for other manufacturers, is announced by The Tait Mfg. Co., Dayton, Ohio.

• Appointment of **Earl Erich** as sales manager of Tube Turns Plastics, Inc., Louisville, Ky., was announced. With the company since May, 1955, he had organized the Thermoplastics Division of Atlas Mineral Products Company.

• Perfection Industries Div., Hupp Corp., Cleveland, Ohio, has named **Alan H. Jobson Jr.,** district manager of the New York area. He will be responsible for the sale of appliances, including room air conditioners and central heating and air conditioning units in the New York metropolitan area including Long Island, Northern New Jersey and Southern Connecticut.

• Two administrative posts have been created within the sales division of Wolverine Tube, Division of Calumet & Hecla, Inc., Detroit, Mich. **L. G. Fox** was named manager of products and **H. A. Harty,** manager of advertising and sales promotion. Mr. Fox will coordinate activities of all departments responsible for marketing the firm's copper, copper base alloy and aluminum tubular products. Mr. Harty will head both product and general advertising on a national basis and will guide sales promotion for all product lines.

• **Novelty Steam Boiler Works, Inc.,** subsidiary of Ellicott Machine Corp., Baltimore, Md., announces the appointment of Mechanical Works Engineering Co., Clayton (St. Louis), Mo., as district representative for the handling of sales and service in the state of Missouri, on hot water generators, storage vessels, heat exchangers, special fabrication, and novelon linings.

• Brundage Co., Kalamazoo, Mich., announced the appointment of **C. H. "Buck" Guptail** to the new post of process engineering director. During 17 years with the Shakespeare Products Company, he served as divisional and defense plants manager.

• **Dr. Stuart F. Faunce** was named director of new product development by John Wood Mfg. Co., Inc., Conshocken, Pa. He was formerly with the Armour Research Foundation, Chicago, and a member of the faculty of the University of Oklahoma.

• New southeastern sales representative for **Marco Industries, Inc.,** Womelsdorf, Pa., is **Joe E. Parker Co., Atlanta, Ga.,** which firm also represents Dunham Bush, Inc., Heat-X, Inc., Kenmore Machine Products, Inc., Sprague Electric Co., Tecumseh Products Co., and Viking Copper Tube Company.

• **Gerald F. Deer** is newly appointed sales training manager for Bryant Mfg. Co., a division of Carrier Corp., Indianapolis, Ind. Mr. Deer held various sales posts with Stewart-Warner's U.S. Machine Division.

• The appointment of **Gus Vanacore** as air conditioning sales representative for Janitrol Heating & Air Conditioning Div., Surface Combustion Corp., Columbus, Ohio, has been announced. His territory is Philadelphia.

• **S. T. Mackenzie** has been elected a vice president of The Babcock & Wilcox Co., New York, N. Y., and placed in charge of the sales department of the company's Boiler Division. Mr. Mackenzie was formerly sales manager of the sales department and his appointment fills a vacancy created by the retirement of W. T. McCullough, Jr.

• An office for sales and engineering service to Metropolitan New York has been set up under the supervision of **Hans P. Peterson** by Kramer Trenton Co., Trenton, N. J. Mr. Peterson was chief engineer of Bush Mfg. Co., West Hartford, Conn., until he joined the Kramer organization two years ago.

• **Dr. Bela K. Erdoss** has been elected president of The Korfund Company, Inc., Long Island City, N. Y. He also occupies the post of president of Cork Foundation Co., Inc. and Korfund Company (Canada) Ltd. Until recently he was professor of fluid dynamics and director of the Fluid Dynamics Laboratory at Stevens Institute of Technology. Dr. Erdoss succeeds Siegfried Rosenzweig who organized the company in 1923. Mr. Rosenzweig has sold all the stock of these companies and is retiring from active direction of the firms.

(*Concluded on page* 12)

Little Giant Unit Heaters
Universal heating elements, 34 models
31,000 to 684,000 Btu. IUHA Sound rated.
Publication 402

Nesbitt

The Name to Go Buy in Unit Heaters

Nesbitt offers the broadest line of industrial unit heaters unmatched for range of sizes and capacities, versatility, and for construction, performance, appearance, and economy.

A product is no better than the reputation of its maker . . . and Nesbitt unit heaters reflect 40 successful years.

Propeller Fan Unit Heaters
Eight basic sizes, 24 models, 15,200 to 335,000 Btu/hr.
Publication 401

Gas-Fired Unit Heaters
Seven models, 400 to 2900 cfm, 25,000 to 200,000 Btu/hr. input.
Publication 280

Giant Unit Heaters
Twelve basic sizes, choice of 10 heating elements, for larger capacity heating and/or ventilating.
Publication 404

MADE AND SOLD BY JOHN J. NESBITT, INC., PHILADELPHIA 36, PA. SEND FOR PUBLICATIONS

BRIEFLY STATED

(Concluded from page 10)

• American Gas Assn., New York, N. Y., has announced the appointment of **Ralbern H. Murray** as assistant secretary of its Industrial and Commercial Gas Section. Mr. Murray has been with the AGA Utilization Bureau since 1950, where he worked on utilization problems of gas utilities and manufacturers, and served as a local appliance inspector for AGA Laboratories. He was also secretary of ASTM Committee D-3 on Gaseous Fuels.

• Decatur Pump Co., Decatur, Ill., has announced the appointment of **Roy J. Dunning** as assistant sales manager. He was formerly district manager for the company in the East for several years and, before that, in Illinois.

• **C. Benjamin Ramsdell** has been appointed general manager of the General Electric Commercial and Industrial Air Conditioning Department, at the division's headquarters, Bloomfield, New Jersey. Mr. Ramsdell joined the company in 1940 on the engineering training program.

• **Robert P. Marshall,** formerly superintendent of Servel's air conditioning manufacturing division, is currently taking part in a planning program at The Trane Co., La Crosse, Wis., in preparation for the factory superintendent position of the company's new air conditioning equipment plant.

• The appointment of **Carl W. Larson** and **John D. Albright** as senior engineers has been announced by McQuay, Inc., Minneapolis, Minn. Mr. Larson rejoins the company after an absence of three years and will work on product design and development. Mr. Albright will work on heat transfer as related to coil development.

• **Roy C. Hauck** is appointed manager of Ingersoll Conditioned Air Division, Kalamazoo, Mich., and **L. D. Reynolds** is named to succeed him as plant manager of the Primor Products Division, Adrian, Mich., it was announced by the parent Borg-Warner Corporation.

• The association of **Victor J. De Masi** as a junior partner in the architectural firm of Voorhees Walker Smith & Smith, New York, N. Y., was announced.

• Johnson Service Co., Milwaukee, Wis., has established a branch office at Harvey, Ill. The company now has 104 direct branch offices to engineer, install and service its control systems. **Donald G. Cherry** has been appointed sales engineer in charge at Harvey.

• Drayer-Hanson, division of National-U.S. Radiator Corp., Los Angeles, Calif., announced the appointment of **Bill Keichline,** formerly a sales application engineer with the company, to the post of assistant sales manager. Succeeding Mr. Keichline is **Roy Graser** of the engineering department.

• Directors of Johnson Service Co., Milwaukee, Wis., have elected **John H. Colby** as Vice President and General Sales Manager, a newly created position, it was announced. Mr. Colby has been the company's General Sales Manager since March 1956.

• Penn Controls, Inc., Goshen, Ind., has announced the appointment of **Francis X. Fessler** as manager of its heating and gas appliance controls division, succeeding Jack Searls who resigned to join a firm manufacturing heating and air conditioning equipment. In his new post, Mr. Fessler will retain his responsibility for gas appliance control sales. James F. Kinney has been appointed as manager of the pump and air compressor controls division to fill the vacancy created by the promotion.

• **Roy C. Klostermeyer** has rejoined Lewin-Mathes Co., St. Louis, Mo., as assistant director of sales. Working out of the St. Louis office, he will handle tube and rod sales. **Ken Adams,** formerly on the sales staff of its Boston Office, has been appointed district manager of the company's Cincinnati office.

• **The American Brass Co.,** Waterbury, Conn., announced color coding of its copper tubes furnished in straight lengths for water supply, heating and sanitary drainage lines. Color stripe on every tube will show the type and size as a means to quicker identification. Code to be used was established by Copper & Brass Research Association and is as follows: Type K, green; Type L, blue; Type M, red; Type DWV, yellow; and Type TP, gray.

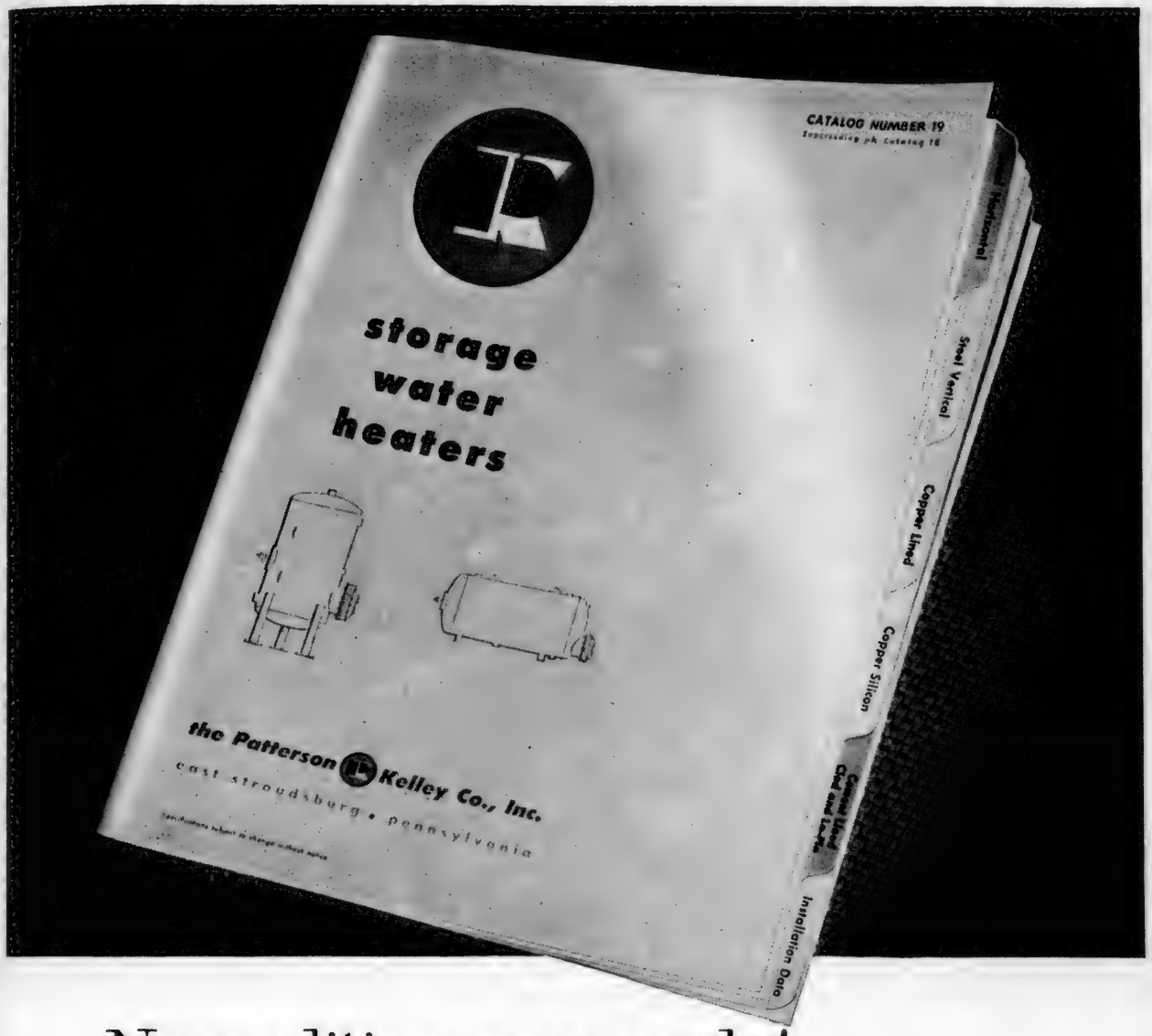
• New representatives in the Buffalo area for Lawler Automatic Controls, Inc., Mount Vernon, N. Y., are **Edward C. Oldach** and **Paul F. Boeckel.**

• Bell & Gosset Co., Morton Grove, Ill., announced that **Joseph Raufeisen** will direct engineering for its new Refrigeration-Compressor Division. This new division will enable the company to produce its own compressors. Mr. Raufeisen graduated from the Swiss State University in Zurich, Switzerland, and was engaged in refrigeration consulting work in that country and the United States.

• Announcement of the appointment of **Milton A. Hanna** as manager of its Tri-sul-ite Division was made by G. S. Ziegler & Co., Great Neck, N. Y. Mr. Hanna had been executive vice-president of Ric-Wil Company when, in 1953, he was appointed assistant to the president of American Gilsonite Company.

• Goulds Pumps, Inc., Seneca Falls, N. Y., announced the promotion of **Philip J. Olmstead** to chief engineer. With the company since 1935, he was assistant chief engineer.

• **James C. Patterson** has retired after 20 years of service with Carrier Corp., Syracuse, N. Y. He had been manager of the company's unit heater department and was instrumental in development of mobile home air conditioning. Since its establishment two years ago he headed the mobile homes department.



New edition now ready!

The Standard Source of Specification Data for Storage Water Heaters

P-K's new tab indexed catalog has all the information required for architects, consulting engineers and contractors to select and specify storage water heaters. Included are individual sections on plain steel, copper-lined, copper silicon, cement-lined heaters, etc. together with detailed installation data.

Tear out the coupon and attach it to your business letterhead!

Patterson Kelley

storage water heaters • instantaneous heaters • converters
fuel oil heaters • freon chillers and condensers

3884

Patterson-Kelley Co., Inc.
920 Burson Street, East Stroudsburg, Pa.

☐ Yes, please send me Catalog No. 19

NAME_____

FIRM_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

MARSH PACKLESS RADIATOR VALVES

WHEEL HANDLE

GRADUATED

LOCK AND SHIELD

ANGLE PATTERN

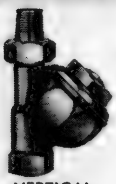
GLOBE PATTERN

CORNER PATTERN (Sectional Below)

MARSH THERMOSTATIC RADIATOR TRAPS

ANGLE PATTERN

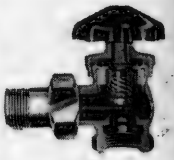
STRAIGHTWAY PATTERN



VERTICAL PATTERN

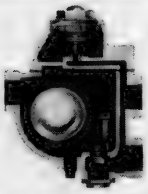
LEFT HAND CORNER PATTERN

RIGHT HAND CORNER PATTERN



CUT OPEN VALVE

F&T TRAPS

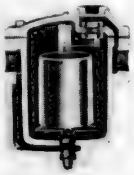


No. 12, REPRESENTATIVE OF WIDE LINE

VENTS

No. 5 VENT, ONE OF MANY

BUCKET TRAPS

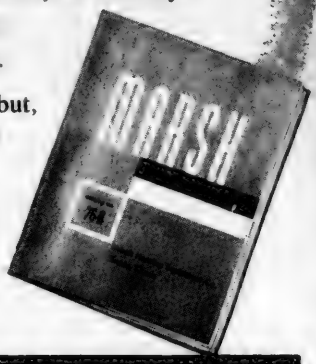


No. 500 INVERTED BUCKET TRAP

All the best of their kind!

You probably have made certain Marsh products your standbys without realizing there are a lot more of them just as superlative as the ones you like so well.

Make the acquaintance of some of them here, but, better still—***Ask for this Marsh Catalog!***



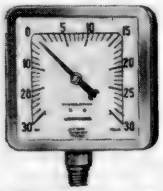
MARSH HEATING EQUIPMENT CO.
Sales affiliate of Jas. P. Marsh Corporation
Dept. U, Skokie, Ill.
Marsh Instrument & Valve Co. (Canada) Ltd.
8407 103rd St., Edmonton, Alberta

SEE OUR EXHIBIT: BOOTH 525
International Heating and Air Conditioning Exposition
CHICAGO Feb. 25 — March 1

MARSH
Heating Specialties since 1865

MARSH BOILER GAUGES

THER-ALTI-METER (Square and Round)



INTERNAL SYPHON (Square and Round)

OUNCE-GRADUATED RETARD (Also Compound)

STANDARD (Also Compound)

"WE USE WEIRKOTE® ONLY— ITS ZINC COATING IS FOR KEEPS!"

You come across that thought a lot when you talk with users of Weirkote zinc-coated steel.

Ask *why* they're so sold and you hear that Weirkote gives a better job at *lower* cost. Weirkote fabricates easily. Takes the toughest crimping, bending, twisting, lock seaming, the deepest draws. Its tight zinc coating stays on for keeps.

Weirkote zinc-coated steel mounts fast because it's rigid. Takes a lot of kicking around on the building site without damage. Makes a good-looking job anyone can be proud of. And it stays that way.

Weirkote is continuous-process zinc-coated steel at its best—highly resistant to corrosion, heat and noise. Cost from sheet to finished sheet metal product is low.

Send for Weirkote Booklet

Look into Weirkote for added efficiency, economy in your operation. For free booklet, write today to Weirton Steel Company, Dept. N-3, *Weirton, West Virginia.*

WEIRTON STEEL COMPANY

WEIRTON STEEL COMPANY

WEIRTON, WEST VIRGINIA

a division of

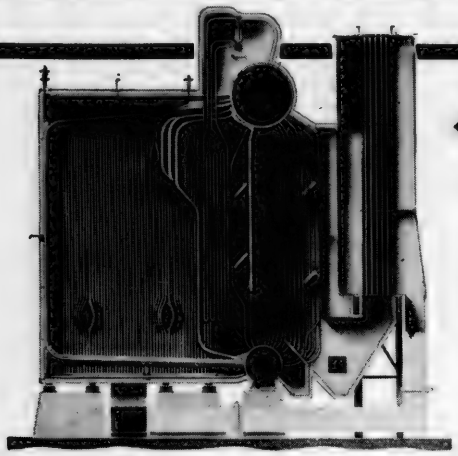
NATIONAL STEEL CORPORATION

one of these C-E standard boilers is . . . .

DESIGNED FOR YOUR PLANT

If your steam needs range between 4,000 and 120,000 pounds per hour, one of these versatile C-E Boilers will give you economical, standout performance. For while they are standard in design (which means lower first cost and proven performance), they're still *flexible* enough to be easily adapted to meet almost any standard requirement.

Chances are that one of the C-E standard boilers is the answer to your steam needs. But whatever they may be, C-E can fill them. For C-E Boilers are made in sizes and types for *any* capacity—for *any* pressure—*any* fuel or method of firing.

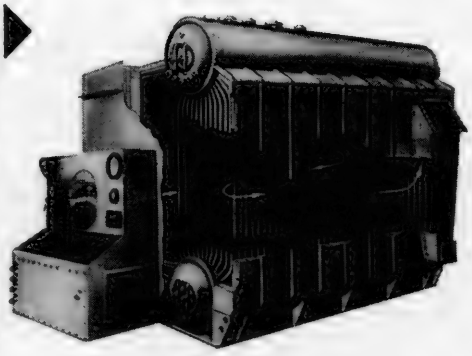


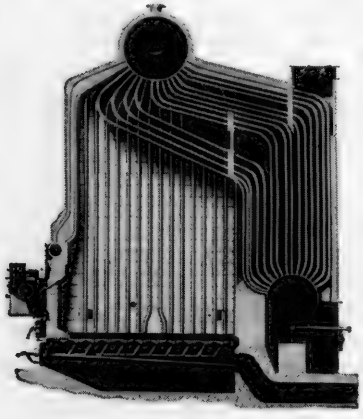
C-E Vertical Unit Boiler, Type VU-55

The VU-55 Boiler is available in five sizes ranging from 50,000 to 120,000 lb of steam per hr. It is designed for pressures from 250 to 750 psi for all sizes and for up to 300 degrees F of superheat. Heat recovery equipment may be added if desired. VU-55 Boilers are designed for the pressure firing of oil or gaseous fuel and require no induced draft fan. They are equipped with tangential burners and tangent furnace tubes to assure a level of performance which compares favorably with modern utility practice. Shop assembly of furnace wall panels and boiler screen tubes saves time and money in handling, transportation and erection. The absence of outside downcomer tubes and ducts makes possible the attractive, streamlined exterior of the VU-55.

C-E Package Boiler, Type VP

This completely shop-assembled boiler is available in fourteen sizes from 4,000 to 40,000 pounds of steam per hour . . . for operating pressures up to 500 psi . . . for pressure firing of liquid or gaseous fuels. The VP Boiler has more water-cooled area per cubic foot of furnace volume than any other boiler of its size and type. The large lower drum—30-inch diameter—permits a simple, symmetrical tube arrangement . . . greater water storage capacity . . . easy access for washing down or inspection. A centrifugal fan, which operates at low speed and is exceptionally quiet in operation, is standard equipment. The simple baffle arrangement results in low draft loss . . . simple soot blowing . . . no dead pockets . . . high heat absorption. The VP is enclosed in a reinforced gas-tight, welded steel casing, and shipped completely assembled with firing equipment, fittings and forced draft fan. For foundation, it needs only a simple concrete slab.





C-E Vertical Unit Boiler, Type VU-10

The VU-10 is available in nine sizes from 10,000 to 60,000 pounds of steam per hour . . . for operating pressures up to 475 psi . . . superheat to 200° F in 20,000-60,000 lb range . . . for solid, liquid, or gaseous fuels. This boiler is a completely standardized design adaptable to many conditions. It is bottom-supported and needs no outside supporting steel. It operates efficiently over a wide range of output, and is easy to operate and to maintain. All parts are easily accessible for inspection. The VU-10 is a complete unit—boiler, furnace, setting, fuel-burning equipment, controls, forced draft, heat recovery equipment (if desired). Regardless of fuel, the same general cross-sectional arrangement of drums, convection bank and furnace wall cooling is used. Uniform design through each transverse section assures even water level in the drum and uniform expansion.

COMBUSTION ENGINEERING

Combustion Engineering Building, 200 Madison Avenue, New York 16, N. Y.

Canada: Combustion Engineering-Superheater Ltd.

STEAM GENERATING UNITS; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; HOME HEATING AND COOLING UNITS; DOMESTIC WATER HEATERS; SOIL PIPE

C-E

B-852G

AT YOUR FINGERTIPS...
JOHNSON
90
80
70
60
50
40
65 75

1. THE FLEXIBILITY
2. THE SIMPLICITY

of Johnson

The age of air conditioning poses new and challenging problems in the selection of control systems – problems resulting from progressively higher comfort standards, from changing architectural concepts and from the frequent introduction of new and better air conditioning equipment.

Out of this multiplicity of problems has come a twofold demand on the part of architects, engineers, builders and owners:

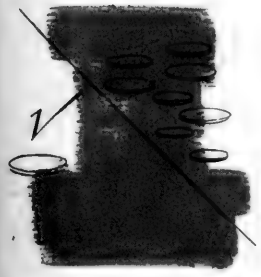
FIRST, for control systems that are so adaptable, so technically perfect, that they are fully capable of solving even the most intricate of these problems.

SECOND, to provide perfection of performance without sacrificing any of the matchless simplicity of installation and operation.

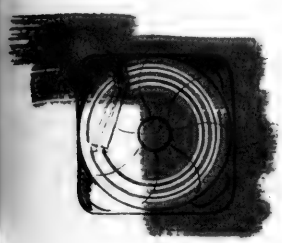
Discover for yourself how pneumatic control – and only pneumatic – successfully combines these two all-important characteristics to an extent that [illegible] duplicated! No [illegible] control – only [illegible] satisfy modern [illegible] ents so com[illegible] pletely an[illegible] tly, ye[illegible] simply a[illegible] re the fact[illegible] eader in pne[illegible] systems for ov[illegible]

Pneumatic Control

PNEUMATIC SIMPLICITY GIVES YOU THESE EXCLUSIVE ADVANTAGES



1 FEWER COMPONENTS. The key to control system simplicity lies in few and simple components. Johnson Pneumatic Control Systems consist of the *fewest possible* number of components. Regardless of how few or how many features you need to provide effective air conditioning control, it's simpler to do it pneumatically. *To produce comparable results by electronic or electric power, or any other method, requires a far greater number of parts and a vastly more complex control system to plan, install, supervise, maintain and service.*

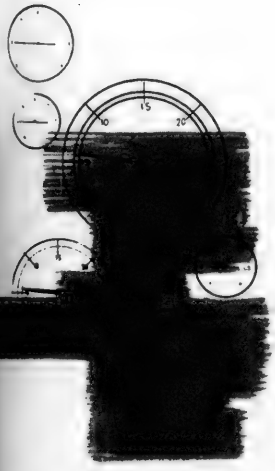


2 GREATER RELIABILITY. Not only are pneumatic components fewer in number but, individually, they are much less vulnerable to failure and damage than other types of components. *The parts of a Johnson Thermostat, for example, will outlast the equivalent parts used in any other type of system.*

With Johnson Pneumatic, there is no intricate array of fragile parts, no cycles of deterioration requiring frequent, regular replacement of delicate components, no gradual loss of control characteristics to upset system balance. Short circuits, electrical overloads, voltage variations and similar problems have no effect whatsoever on Johnson Pneumatic Systems.

Because pneumatic apparatus is basically so accurate, so dependable, so free from extraneous influences, there's no need to be constantly preoccupied with checking component performance and making endless adjustments.

Where real system reliability is essential—to insure uninterrupted comfort or to protect products and processes—Johnson Pneumatic Control meets every requirement.



3 MINIMUM UPKEEP. Both ordinary maintenance and trouble shooting are greatly simplified with Johnson Pneumatic. There are fewer components to check, fewer moving parts subject to wear. Control pressure gauges, located throughout the system, provide an instant, on-the-spot check of performance *without shutting down the heating, ventilating or air conditioning system.* Expensive testing equipment is unnecessary. And only pneumatic gives you the choice to repair or replace components. Thanks to universal familiarity with the principles of pneumatic operation, ordinary service adjustments can be performed at nominal cost by the owner's own staff.

With other forms of control, servicing and trouble shooting are much more difficult and considerably more costly. Owners must be prepared against sudden breakdowns by carrying inventories of spare components. When trouble develops, a number of components must be checked with test equipment, usually with the system shut down. Test apparatus is expensive and difficult to apply. During adjustment, it is difficult to observe how the components are functioning since *there is no permanently installed equivalent to the pneumatic control pressure gauge.*

Few buildings have employees capable of providing such service. Owners are forced to depend on the scattered service facilities of manufacturers. *Only pneumatic gives you unlimited ability to check performance and to do it surely, inexpensively and promptly.*

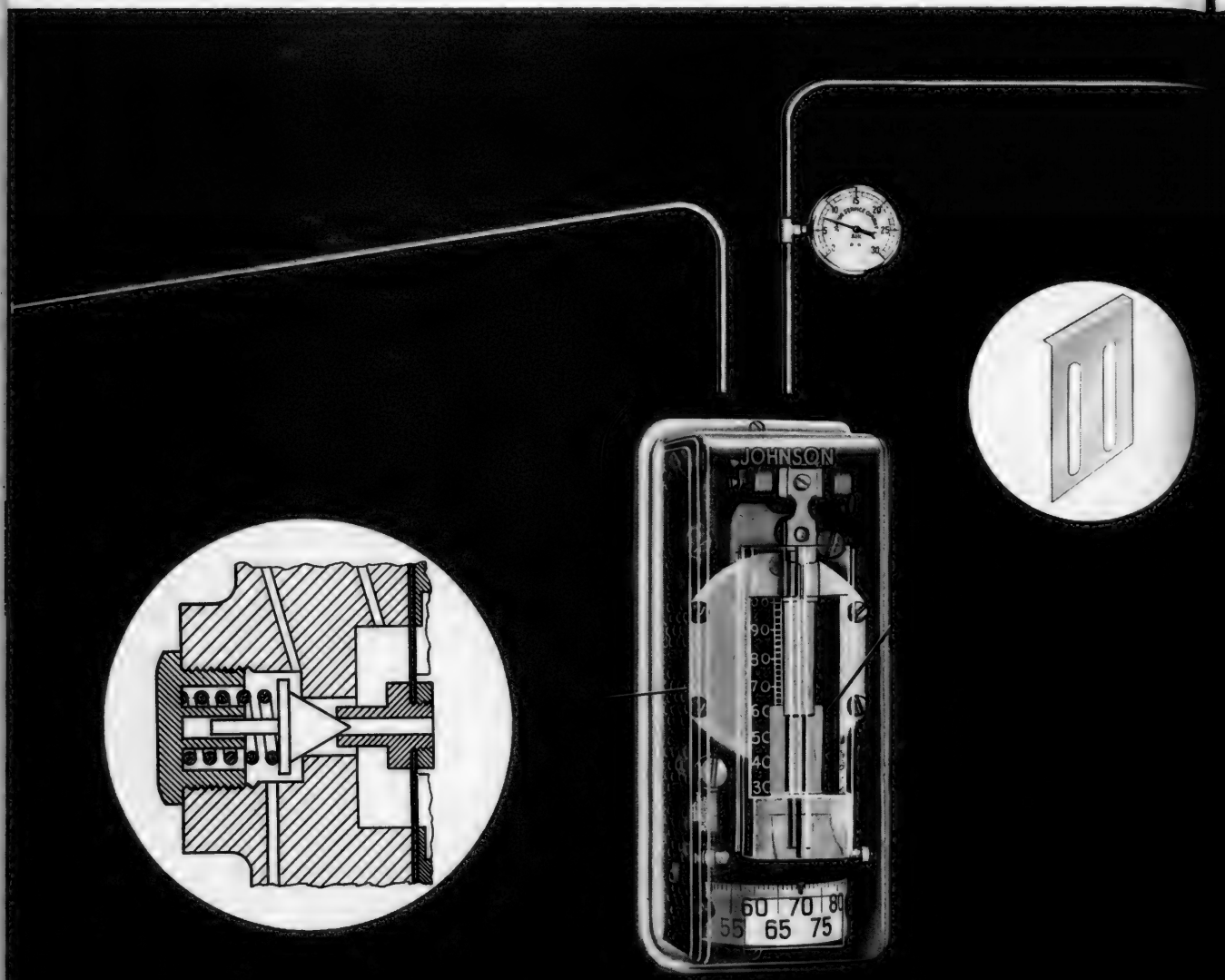
Simplicity, alone, is reason enough to justify the selection of pneumatic control, for it is by far the most practical, most economical of all forms of control. As the following pages show, it's this very simplicity that also makes possible standards of performance that are unsurpassed by anything else you can use, regardless of cost!

ONLY PNEUMATIC GIVES YOU

The basic components of Johnson Pneumatic Control, shown below, reveal how remarkably simple and free from complication the best air conditioning control systems can be.

The Johnson Room Thermostat—the world's most accepted thermostat—is a refined reducing valve in a compressed air line, set and reset automatically by an accurate bi-metal temperature measuring element, to transmit compressed air, at varying pressures, to valves, dampers and other devices.

Johnson Diaphragm Valves and Damper Operators are equally simple devices with flexible, long-life diaphragms which are moved as the thermostat transmits

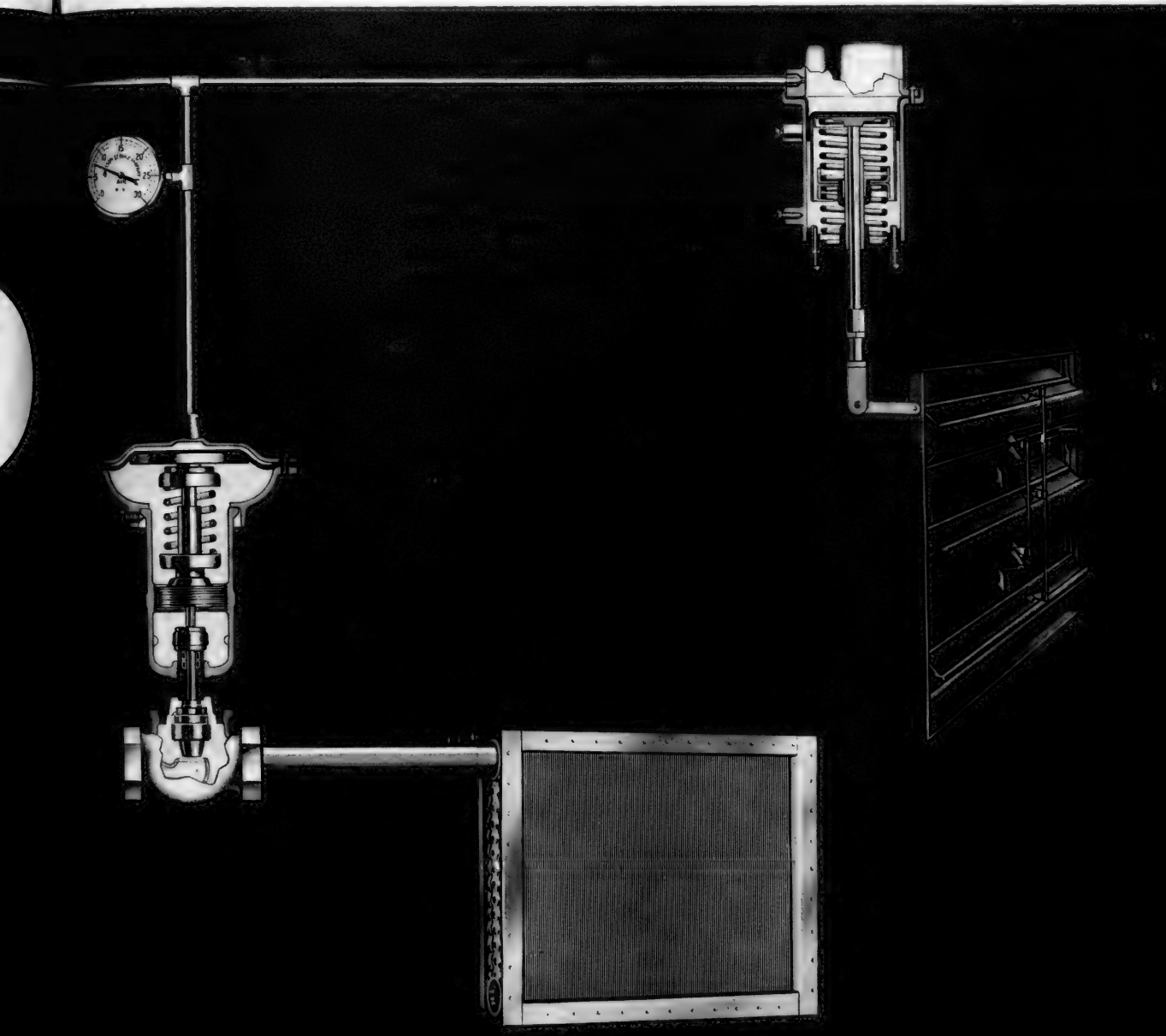


System-wide SIMPLICITY

changes in air pressure. Johnson offers the most complete line of pneumatic equipment for solving all temperature, humidity and pressure control problems.

The widespread use of pneumatic power by other industries offers further evidence of its simplicity and adaptability. Examples include truck and train brake systems, industrial power tools, hoists, bus suspension systems, lubricating equipment, machine tools and countless others.

Compare *systems* carefully. You'll discover that Johnson pneumatic apparatus is simpler by far and that you can do control work with just a fraction of the components that would otherwise be required.

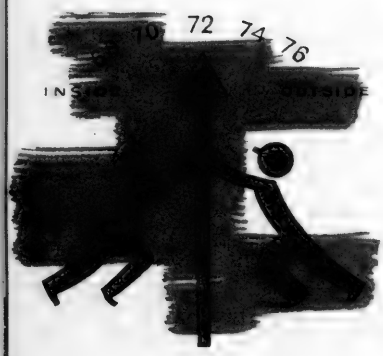


"...the state or quality of being adaptable; of being responsive to the need..."

...THAT'S *Pneumatic flexibility.*

With Johnson Pneumatic Control you get all the features you need to make any air conditioning system perform up to expectations. No matter how difficult or diversified the problems may be, pneumatic flexibility makes it far easier, simpler and more practical to produce the desired results. For example, today's streamlined pneumatic control lets you count on—

IMPROVED COMPENSATION



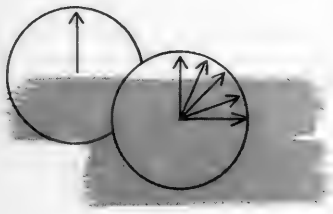
One of the essentials of a really efficient control system is the ability to provide fast, accurate compensation for *any* condition, indoors or out, that affects comfort.

With modern Johnson Pneumatic Controls and their special features, you can easily compensate for changes in occupancy levels (no matter how sudden or extreme), for the heat-producing effects of lights, office equipment or industrial processes, for changes in outdoor temperatures and exposure factors. You can avoid temperature "drift" by varying the ratio of compensation to match the weather—always maintaining the ideal relationship between indoor and outdoor conditions. You can have compensation in as few or as many zones as desired.

You enjoy uniformly comfortable temperatures. High speed pneumatic compensation takes sudden load changes in stride, holds temperatures consistently comfortable.

In judging comparative response rates, bear in mind the fallacy of basing your judgment on the speed of a single control component, when, actually, it's *system response* that determines how fast you get corrective action. Johnson Pneumatic supersensitive controllers, capable of any required sensitivity, team up with other pneumatic components to produce corrective action in a much shorter elapsed time than that needed by any other control system. *For the fastest system response, you have to go pneumatic!*

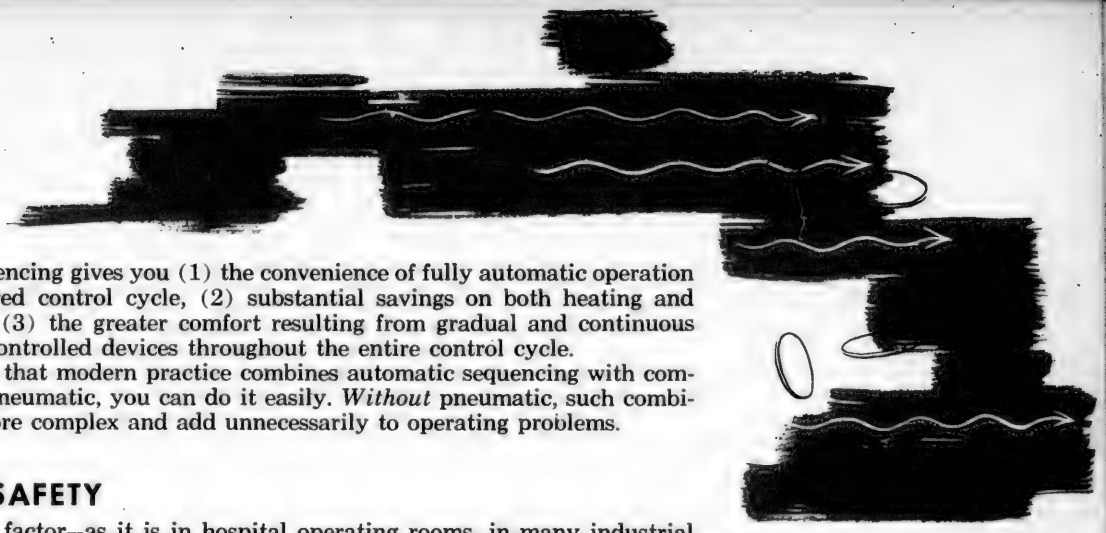
And, thanks to the precise stabilizing action of Johnson Submaster Thermostats, pneumatic compensation provides corrective action without "hunting," without over-compensating.



Without pneumatic, it is difficult to set limits when modifying control ranges. You get what amounts to "runaway" compensation. Whether you want them to or not, thermostats go on compensating indefinitely, allowing temperatures to pass practical limits. Only pneumatic gives you *fully controlled compensation,* within definitely established upper and lower limits.

AUTOMATIC SEQUENCING

Precise automatic sequencing adds immeasurably to air conditioning efficiency. Automatic change-over from heating to cooling operation, the Johnson-pioneered "economizer" cycle for inexpensive, natural cooling with outdoor air, weekend cut-out cycles, separate day-night operating cycles—they're all yours with Johnson Pneumatic.



Pneumatic sequencing gives you (1) the convenience of fully automatic operation through any desired control cycle, (2) substantial savings on both heating and cooling costs and (3) the greater comfort resulting from gradual and continuous operation of the controlled devices throughout the entire control cycle.

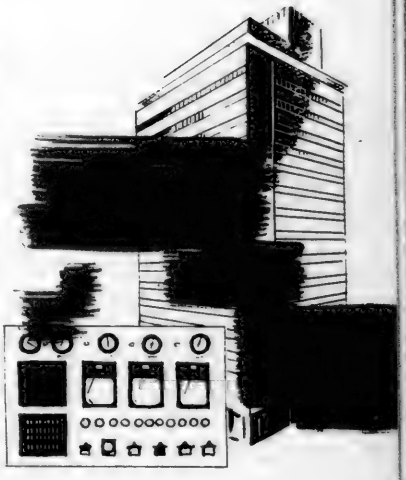
Remember, too, that modern practice combines automatic sequencing with compensation. *With* pneumatic, you can do it easily. *Without* pneumatic, such combinations are far more complex and add unnecessarily to operating problems.

MAXIMUM SAFETY

Where safety is a factor—as it is in hospital operating rooms, in many industrial plants and research laboratories—it properly takes precedence over any other consideration. The answer, obviously, is to go pneumatic, for only pneumatic insures complete protection under hazardous conditions.

Pneumatic control is explosion-proof. You can locate Johnson Thermostats, Humidostats and other apparatus anywhere in complete safety, even in the presence of explosive gases, solvents, dusts and other hazardous materials. Here, again, pneumatic flexibility pays off—there's no need to compromise safety, no need to settle for less effective, substitute control arrangements, no need to install special protective devices. Flow of instrument air is always outward, preventing room contaminants from damaging working parts of the instrument.

SIMPLIFIED OPERATION



Only pneumatic control gives you unlimited freedom to observe and direct system operation. Whichever way is most convenient, most effective, you can do it pneumatically.

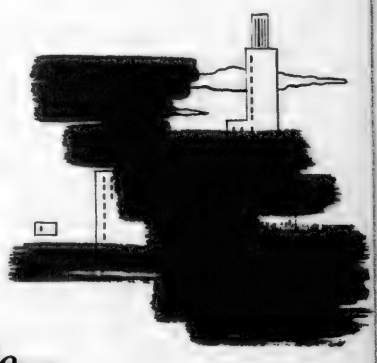
Johnson Control Centers give you the advantage of central control panels which, from a single remote point, allow you to observe and record air and water temperatures throughout the system, reset thermostats, make day-night and heating-cooling change-overs, vary outdoor air for ventilation and cooling. In short, you can do everything from one convenient location.

Sometimes, though, it's more practical to use *de*centralized control, grouping controls on zone panels. Or you may want a separate control panel for each central unit, mounted right at the unit. Pneumatic flexibility lets you do it either way.

The system-wide display of performance data, by means of unlimited numbers of inexpensive control pressure gauges, adds tremendously to operating convenience and efficiency. Even the most comprehensive central control panels can't substitute for the time and effort saved by having this vital information available at the actual point of control. It's one of pneumatic's most important advantages and it's exclusive with pneumatic!

Thermostat operation is likewise flexible. You can change settings at the thermostat itself or provide for remote adjustments from a central control panel. Locked and concealed adjustment model thermostats are effectively used to prevent tampering. Keep in mind, too, that pneumatic simplicity eliminates personnel headaches. Experienced personnel, already familiar with pneumatic devices, are generally available. Almost anyone with mechanical aptitude or experience can quickly become competent to operate today's simplified pneumatic systems. The inherent complexities of other methods of control and the difficulty of making proper observations of performance only add needlessly to the owner's problems and costs.

WIDEST ADAPTABILITY



In contrast to the limited applications of other controls, only pneumatic control is capable of providing optimum results with all types of air conditioning systems. This applies to central fan systems, radiant heating and cooling panels, reverse cycle systems, unit air conditioners, double or single duct systems. Pneumatic alone possesses sufficient flexibility to take any job in stride.

only pneumatic is so completely flexible—
yet so simple, so economical

JOHNSON "SERVICE"

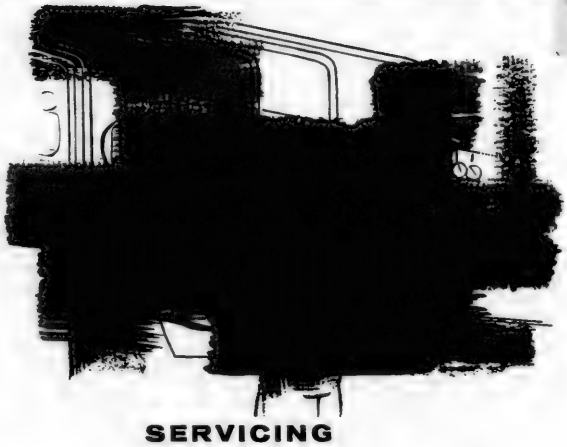
A 72-year success story

complete responsibility centered in one organization

PLANNING

MANUFACTURING

INSTALLING



SERVICING

The Johnson Service Company maintains the *only* nationwide organization devoted exclusively to planning, manufacturing, installing and servicing automatic temperature and air conditioning control systems. This undivided responsibility for, and continuing interest in, all phases of the control job is your assurance of satisfaction with every Johnson Pneumatic Control System.

To serve you promptly and efficiently, there are 105 direct branch offices in the United States and Canada, each with a complete staff consisting of branch manager, sales engineers, technicians, superintendent of installations, clerks and mechanics. In addition, Johnson maintains the finest service organization in the control industry, with full-time factory-trained mechanics stationed in some 200 cities.

JOHNSON CONTROL

SINCE 1885

JOHNSON SERVICE COMPANY
Milwaukee 1, Wisconsin
Export Division, New York 16, N. Y.

JOHNSON TEMPERATURE REGULATING COMPANY OF CANADA, LTD.
Toronto 16, Ontario

Printed in U. S. A.

One of a series appearing in FORTUNE *and leading architectural magazines.*

puzzlement

What happened to the hole in Lewin-Mathes Tube?

It's been eliminated in *part* of our production . . . so that users of Brass Rod can now enjoy the same standard of quality and service which has been responsible for the popularity of Lewin-Mathes Copper and Brass Tube and Pipe during the past 25 years.

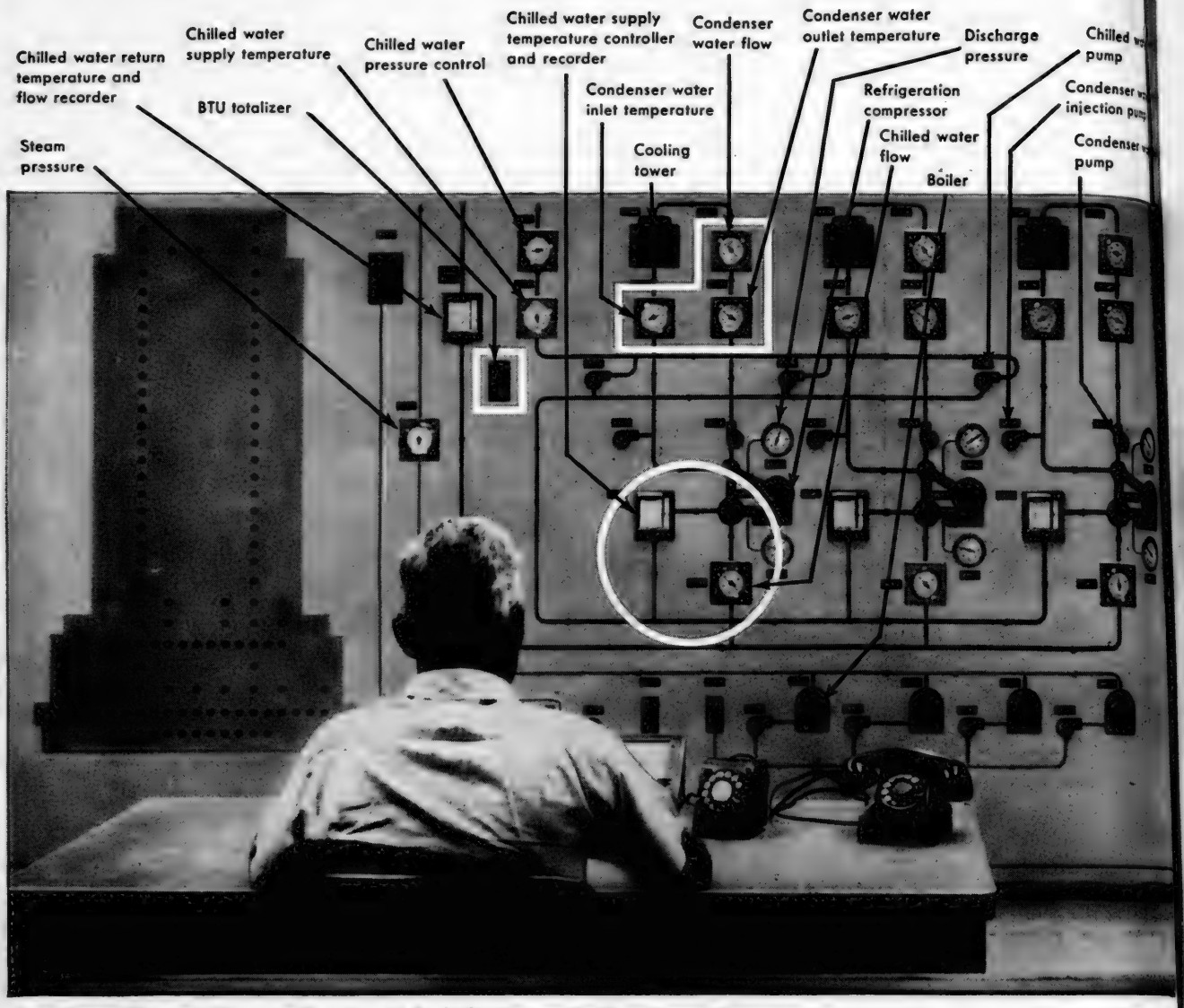
In designing America's most modern Brass Rod mill, Lewin-Mathes has pioneered new automatic production and testing methods . . . adding even greater efficiency to our already *completely integrated* plant.

Now more than ever, specifying uniformly perfect Tube, Pipe and Rod is no puzzlement. Simply remember Lewin-Mathes—the *integrated specialist!*

LEWIN MATHES

SAINT LOUIS, MISSOURI

MANUFACTURERS OF
COPPER AND BRASS TUBE, PIPE AND ROD



View of rear wall portion of Supervisory DataCenter in Bank of the Southwest Building, Houston, Texas. Additional panels are installed on right and left walls. One man, from this one room, controls heating—cooling system for the entire 22-story building.

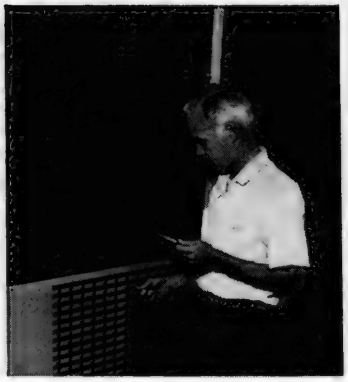
Left-Hand Panel. Located here are start-stop buttons for each electrical motor, for all pumps and fan compressors in the entire air conditioning system. Pilot lights located back of the start-stop switches and on the building outline on the back panel indicate at all times which equipment is operating.

Back Panel

The performance of each cooling tower and each refrigeration condenser may be checked by the measurement of condenser water flow and condenser water inlet and outlet temperature.

The performance of each refrigeration compressor may be checked by the measurement of chilled water flow and supply, and return water temperature. Chilled water supply controller indicates, records, and controls chilled water supply. Operator can change or adjust temperature at the instrument.

The performance of the refrigeration plant may be checked by the measurement of BTU's as shown on the digit-counter which indicates total heat transfer.



Right-Hand Panel. Here operator can change individual control point of 396 thermostats throughout the building. Exact temperatures at each thermostat can be read at a large electrical indicator. A separate electronic instrument can record simultaneously the temperature at *any* 12 locations throughout the building for analyzing system operation.

Control leadership through advanced engineering-research

Honeywell Supervisory DataCenter— Automation for Air Conditioning

"CENTER" is the key word in the name of this new Honeywell development.

For the Supervisory DataCenter concept begins with the centralization of equipment that before was scattered throughout a building.

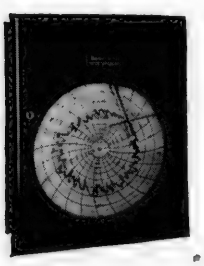
Greater operating efficiency with fewer personnel . . . longer equipment life . . . operational savings that liquidate cost . . . attractive display of your engineering-design—all this can be accomplished with the centralization made possible by the Honeywell Supervisory DataCenter.

To learn *how* these things are accomplished by the Honeywell Supervisory DataCenter see the individual panel explanations.

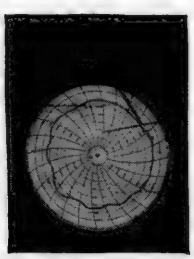
For further information about the DataCenter and other Honeywell control concepts, call your local Honeywell office. Or write to Honeywell, Dept. HV-2-46, Minneapolis 8, Minnesota.

Individual Instruments for measurement and control

Key information can be supplied for installations that have no DataCenter through the use of conventional size instruments. Honeywell has available a complete line of such instruments which can be made a part of any installation. Examples of instrumentation for three important variables follow.



Water flow—Condenser water flow for checking cooling tower and condenser performance . . . chilled water flow for checking chiller performance. Steam flow for checking boiler performance. Honeywell flowmeters such as this can give an indication of instantaneous flow, a recording of changes in flow or total flow over a considerable period of time.



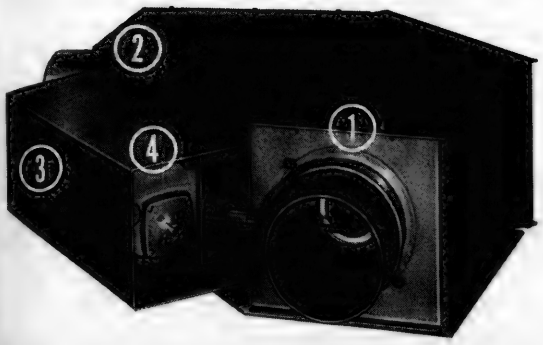
Temperature—Condenser water supply and return temperatures for checking cooling tower and condenser performance . . . chilled water supply and return temperatures for checking chiller performance. These instruments can give an indication of instantaneous temperature or record change. Indicators and recorders are available as controllers.

BTU's—This instrument receives signals simultaneously of the temperature difference and the flow and combines them to give the total heat transfer in BTU's. By comparing power input to refrigeration compressors with BTU's consumed, efficiency can be determined and the plant run at optimum. This can save thousands of dollars annually.

For another big, exciting Honeywell development in air conditioning control, turn the page.

Control leadership through advanced engineering-research
Solves your dual-duct high velocity distribution problems

Dial adjusted only once—when you uncrate blender or at time of installation—Room thermostat takes over from then on. Calibrated dial air balancing is the key to the superior performance of the Honeywell High Velocity Air Blender. It consists of simple adjustments of internal blender components (see next page). Once balanced, control is in the hands of the system thermostats. And it stays there—giving your clients the kind of comfort they like to have.



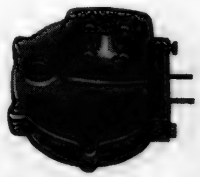
The complete blender

This is how the conventional packaged blender looks. From it you and your clients can expect controlled volume of air, constant CFM, long valve life and simplified control.

1. Cold Valve—(containing the diaphragm—the only moving part) controls the total air flow from the unit.

2. Hot Valve—like the cold valve, but with a scale on the variable orifice as part of *dial balancing* system.

3. Flow Regulator—with calibrated dial (CFM or inches of water) to preset total flow of the unit.



4. Submaster Regulator—similar to the Flow Regulator. Reacts to signals from room thermostat.

Revolutionary Dial Air Balancing—With New Honeywell Air Blender

Provides constant delivered air volume—one room can't rob air from another

WITH DIAL air balancing the room thermostat is now free to do its job right.

Occupants get the level of comfort they call for. And it doesn't come at the expense of some other room. It comes from the system. *One room no longer "robs" another of comfort.*

Self-powered, the Honeywell Air Blender uses the air pressure of the high velocity air it is controlling to actuate its diaphragm—its only moving part.

For further information about Honeywell High Velocity Air Blenders and other Honeywell heating and air conditioning products, call your local Honeywell office. Or write to Honeywell, Dept. HV-2-46, Minneapolis 8, Minnesota.

Room thermostat—the ***Honeywell Round***

The "new" look in thermostats that's appearing on walls of commercial buildings throughout America. New design *inside* gives closer control, vastly superior performance.

MINNEAPOLIS **Honeywell**

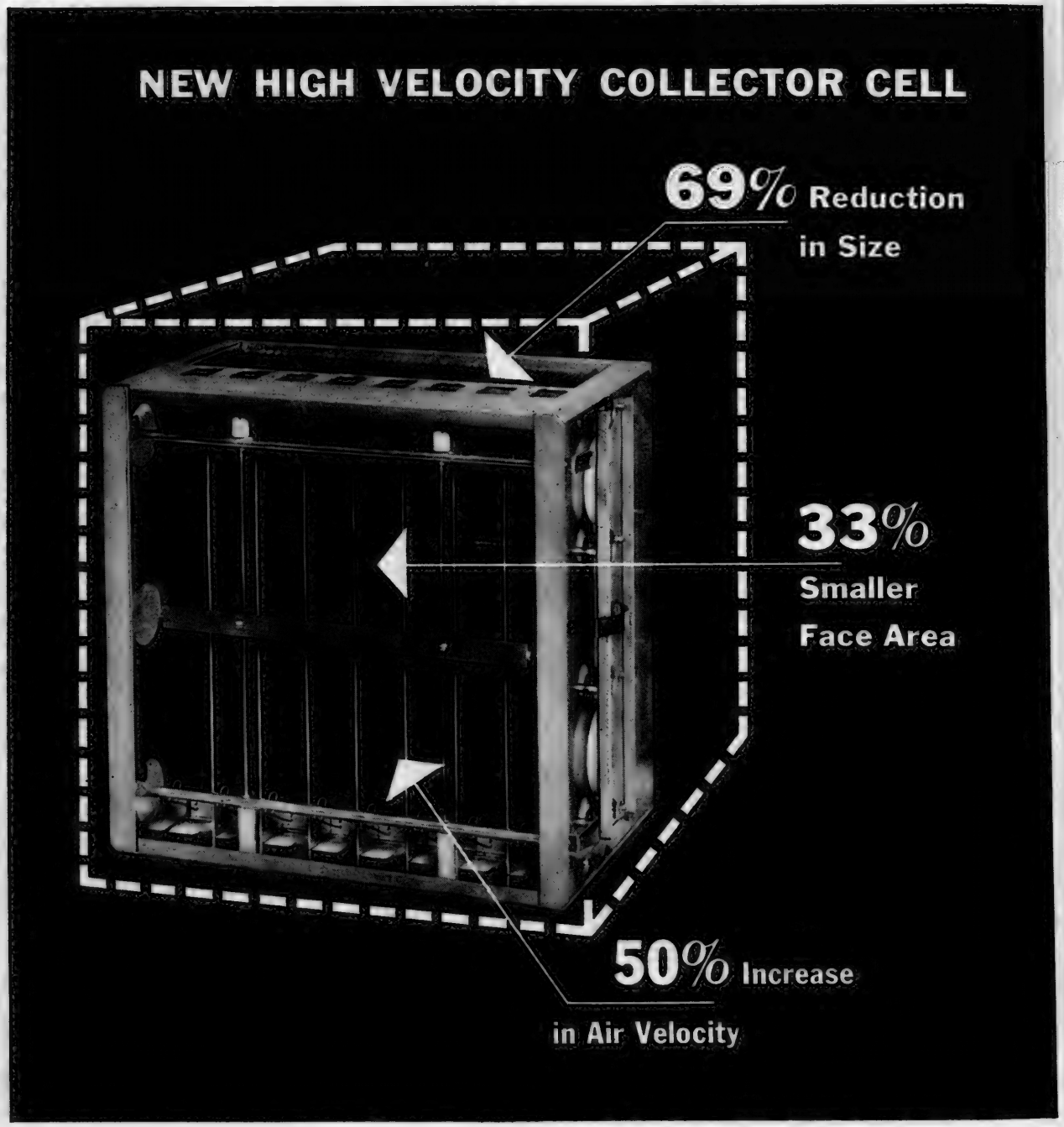
112 offices across the nation

First in heating-cooling controls

Only Honeywell gives you all four—pneumatic, electric, electronic, instruments.

NOW! Precipitron® prices reduced

ON NEW MODEL WESTINGHOUSE COSTLY TO OWN AND OPERATE



25%...Capacity Increased 50%

ELECTRONIC AIR CLEANER...NOW LESS THAN AUTOMATIC MECHANICAL FILTERS

5 MORE WAYS YOU SAVE:

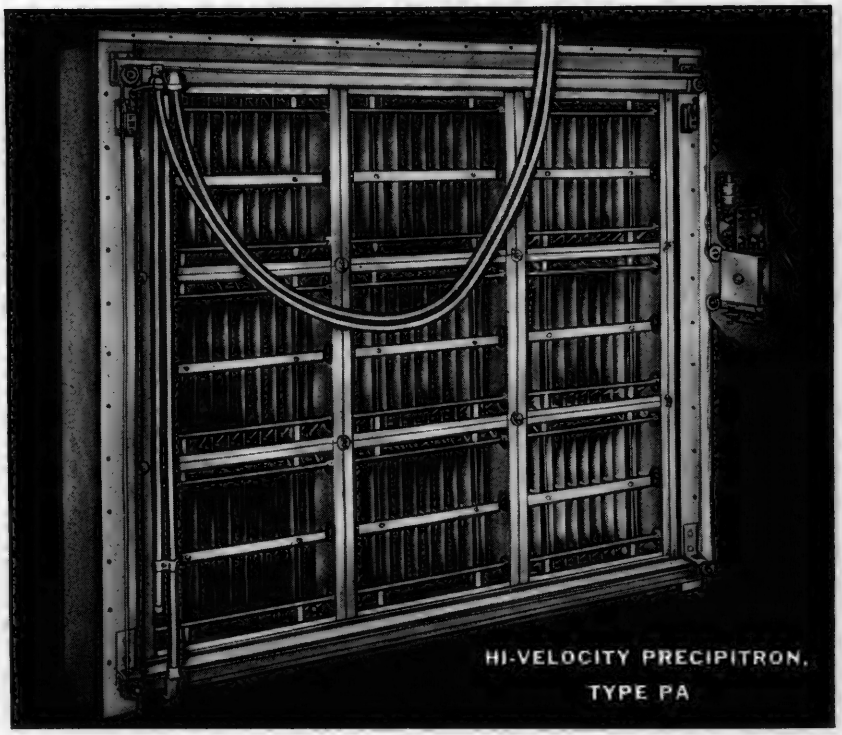
1. New PRECIPITRON cells now available in same sizes as ordinary panel filters!

2. Minimum maintenance . . . completely automatic washing . . . no filters to store, clean, or replace.

3. Reduced installation costs . . . smaller size, less duct work, no high voltage wiring!

4. Now cold water adhesive eliminates need for hot water washing.

5. New simplified design provides easy, rapid and economical field assembly!



HI-VELOCITY PRECIPITRON, TYPE PA

Now . . . with this outstanding product advance and price reduction, you can replace your present mechanical filtering system with Westinghouse PRECIPITRON, and enjoy more efficient air cleaning – at no extra cost!

Call your nearest Sturtevant Division Sales Engineer about this newest development in Electronic Air Cleaning, or write to Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Massachusetts.

To be shown for the first time at the International Heating and Air Conditioning Exposition, Chicago, February 25th.

Westinghouse Booths #902, #1003, #1007

WESTINGHOUSE AIR CLEANING

J-80612

YOU CAN BE SURE...IF IT'S Westinghouse

Production of popular pipe insulation has been increased 150% so that —

Now EVERYONE

G-B SNAP*ON DISTRIBUTORS

ALBUQUERQUE, Mt. States Insulation Co.
AMARILLO, Ball Distributing & Engr. Co.
APPLETON, J. D. Wilson Co.
ATLANTA, Ga., Southern States Iron Roofing Co.
BILLINGS, Mont., L. W. Worthington
BIRMINGHAM, Ala., Shook & Fletcher Supply
Southern States Iron Roofing Co.
BROOKLINE, Mass., Homans-Kohler, Inc.
BUFFALO, Frontier Insulation & Supply Co.
CHARLESTON, W. Va., Baldwin Asbestos Products Co.
CHARLESTON HEIGHTS, S. C., Stafford Insulation Co.
CHARLOTTE, N. C., Guy M. Beaty & Co.
CHATTANOOGA, Guy M. Beaty & Co.
CHICAGO, E. C. Carlson Co.
CINCINNATI, R. E. Kramig & Co.
CLEVELAND, The Miles Materials Co.
COLUMBIA, S. C., Southern States Iron Roofing Co.
COLUMBUS, Santeler Brothers
DALLAS, Insulation Supply Co., Inc.
DAVENPORT, Republic Electric Co.
DENVER, Gene Wright Lumber Co.
DETROIT, Coon-DeVisser Co.
EL PASO, Insulation & Specialties Co.
FARGO, N. D., Smith, Inc.
FT. SMITH, Ark., Gunn Distributing Co.
FT. WAYNE, Ind., M. H. Hilt, Inc.
FT. WORTH, The Bracken Co.
GREENSBORO, N. C., Starr Davis Co., Inc.
GULFPORT, Miss., Paine Supply Co.
HOUSTON, Precision Insulation Co.
INDIANAPOLIS, Central Supply Co.
IRON MOUNTAIN, Mich., Champion, Inc.
JACKSON, Miss., Paine Refrigeration Supply Co.
JOPLIN, Mo., Joplin Cement Co.
KANSAS CITY, Kelley Asbestos Co.
LITTLE ROCK, Gunn Distributing Co.
LOS ANGELES, Western Fibrous Glass Products
Plant Insulation Co.
LOUISVILLE, General Insulation & Roofing Co.
MADISON, Wis., J. D. Wilson Co.
MEMPHIS, John A. Denie's Sons Co.
MIAMI, Southern States Iron Roofing Co.
MILWAUKEE, J. D. Wilson Co.
MINNEAPOLIS, Asbestos Products, Inc.
MOBILE, Ala., Shook & Fletcher
NASHVILLE, Southern States Iron Roofing Co.
NEWARK, N. J., Eastern Steam Specialty Co.
NEW HAVEN, Conn., Insulation Supply Co.
NEW ORLEANS, Eagle Asbestos & Packing
NEW YORK, Eastern Steam Specialty Co.
OKLAHOMA CITY, Ball Distributing & Engineering Co.
OMAHA, Cardinal Supply & Mfg. Co.
PHILADELPHIA, John F. Scanlan, Inc.
PITTSBURGH, Dravo Corp.
PHOENIX, Ariz., Kircher Asbestos & Rubber Co.
RALEIGH, N. C., Southern States Iron Roofing Co.
RICHMOND, Va., Southern States Iron Roofing Co.
ROCKFORD, Ill., Mott Brothers Co.
SALT LAKE CITY, Bullough Asbestos Supply Co.
SAN ANTONIO, The Bracken Co.
SAN DIEGO, Western Fibrous Glass Products
SAN FRANCISCO, Western Fibrous Glass Products
SAVANNAH, Ga., Southern States Iron Roofing Co.
SCHENECTADY, N. Y., Jon Tree Sales & Supply Co.
SEATTLE, Western Fibrous Glass Products
ST. LOUIS, A. G. Brauer Supply Co.
ST. PAUL, Asbestos Products, Inc.
SYRACUSE, N. Y., Industrial Supply Co.
TAMPA, Fla., Eagle Roofing & Art Metal Works, Inc.
TALLAHASSEE, Fla., Capital Refrigeration & Supply
TULSA, Okla., Ball Distributing & Engr. Co.
TUPELO, Miss., Paine Supply Co.
WASHINGTON, Walter E. Campbell Co., Inc.
WICHITA, Jamar-Olmen Construction Co.
VANCOUVER, B. C., Fleck Brothers Limited

GUSTIN gb BACON

SNAP*ON... THE ONE AND ONLY ONE-PIECE MOLDED PIPE INSULATION OF FINE GLASS FIBERS

Sensational demand has kept Snap*On in short supply ever since its introduction several years ago — but now *everyone* can get Snap*On! To meet the ever-growing demand for this new lightweight insulation that "just snaps on the pipe", we recently made a substantial addition to its production facilities to increase Snap*On production by 150%. These new facilities are turning out the same beautifully uniform one-piece sections that have won such amazing acceptance throughout industry. Here, in a nutshell, is why Snap*On is the *standard specification* in so many industries:

Highest thermal efficiency of any pipe insulating material on the market in its temperature range.

Lower applied cost — just spread the single seam and it snaps on the pipe.

Extremely light weight . . . virtually immune to damage or breakage . . . permanent as glass itself.

So figure Snap*On in all your plans for dual-temperature, cold or heated piping where temperatures do not exceed 350° F. Whether on straight runs, on nested or tracer lines, or at flanges, valves and fittings, Snap*On's flexibility will save you time and money. It's available *now* . . . in sizes from ½" to 33" IPS from your local Snap*On distributor. His name is listed in the column at left. Call him now or—

WRITE FOR NEW 8-PAGE SNAP*ON BROCHURE

*Trademark Reg.

can get SNAP*ON!

SNAP*ON . . . FOR LOW PRESSURE STEAM AND HOT WATER. For smaller lines carrying hot water or low pressure steam at temperatures up to 250°, ½" thick Snap*On is thermally superior to thicker insulations and far easier to install. Despite its light weight, its tough, resilient structure resists mechanical abuse. Snap*On *cannot* shrink and is not affected by moisture.

SNAP*ON . . . FOR SERVICES TO 350° F. In wall thicknesses from ¾" to 3" Snap*On is an ideal pipe insulation for industrial processing plants and for commercial and institutional buildings, both from the standpoint of initial cost and long-range heat savings. It is available plain, or canvas jacketed, in sizes from ½" to 33" IPS.

SNAP*ON . . . FOR DUAL-TEMPERATURE AND COLD PIPING. For such service, Snap*On is available with a wide variety of factory-applied jackets that solve every problem involving appearance, vapor resistance and fire resistance. All jacketed Snap*On comes in easy-to-handle, easy-to-apply 3′ sections.

SNAP*ON . . . FOR BIG PIPING, INDOORS OR OUT. Just one easy spread-and-snap motion of the single seam—and 6 feet of 16" pipe is insulated! Fewer seams mean faster application, and far greater thermal efficiency. Plain Snap*On is available in these 6-ft. sections in sizes from 6" - 33". For outdoor use, it can also be supplied with factory-adhered weatherproofed jackets.

GUSTIN-BACON *Manufacturing Company* GUSTIN gb BACON

Thermal and acoustical glass fiber insulations • Pipe couplings and fittings • Molded glass fiber pipe insulation

222 W. 10th ST., KANSAS CITY, MO.

VISIT OUR BOOTH 729-731 AT THE ASH & AE SHOW

How *high velocity* solves problem of *flexibility* in the Medical Towers

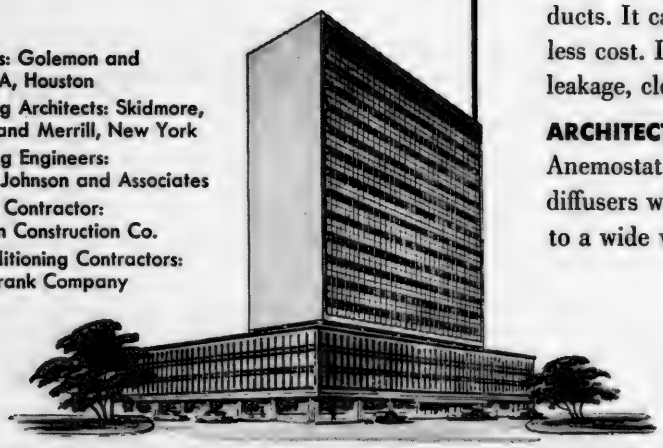
When the new Medical Towers Building in Houston, Texas was planned, the key air conditioning problem was flexibility. Professional office areas had to be subdivided *after* the building was completed. Here's how an Anemostat dual duct high velocity air distribution system solved the problem.

As shown in the diagrammatic sketch, a system of perimeter take-offs from the hot and cold ducts enables each doctor to provide the exact temperature he wants. Temperatures in the various rooms of each suite of offices can be varied. Air distribution is draftless, comfortable, perfectly suited to tenants' needs.

The Anemostat All-Air High Velocity distribution system offers further important advantages. It can be used with smaller than conventional ducts. It can be installed in less time and at less cost. It requires no coils, thus eliminates leakage, clogging and odors.

ARCHITECTS—Attention Please:
Anemostat round, square and straightline diffusers with high velocity units are adaptable to a wide variety of architectural designs.

Architects: Golemon and Rolfe, AIA, Houston
Consulting Architects: Skidmore, Owings and Merrill, New York
Consulting Engineers: Bernard Johnson and Associates
General Contractor: Tellepsen Construction Co.
Air Conditioning Contractors: Straus-Frank Company

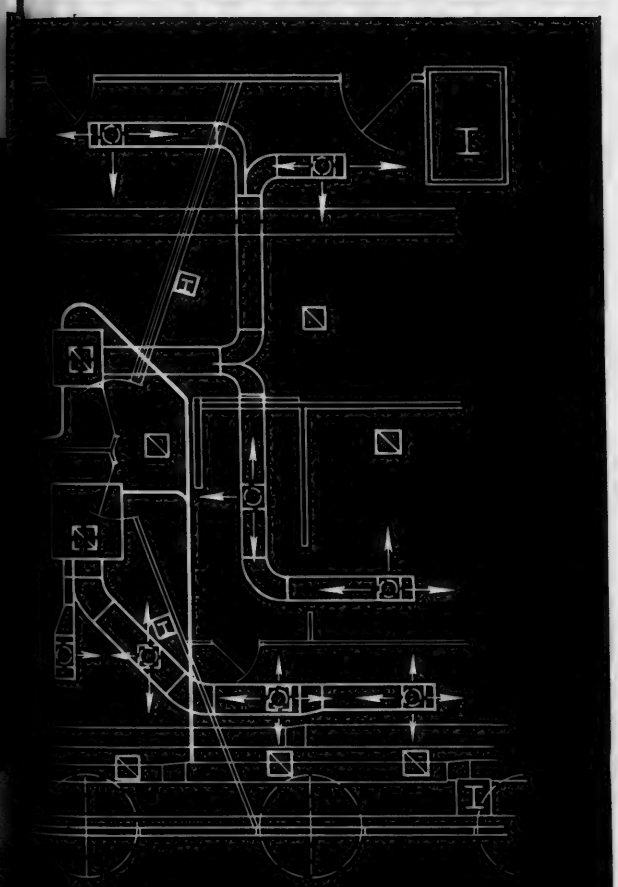


Anemostat HPE units and duct connections installed in office before construction of ceiling and walls

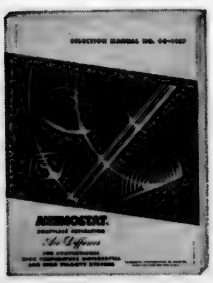
Note how locating of hot and cold ducts saves space in new Medical Towers Building, Houston, Texas

View of lobby showing Anemostat Air Diffusers

View of professional reception room



Layout of typical suite



Write on your business letterhead for your copy of

New Anemostat Selection Manual 60

to Anemostat Corporation of America, 10 East 39 Street, New York 16, N. Y.

ANEMOSTAT: The pioneer of All-Air High Velocity Systems

Why sheet-metal men enthuse over Bethcon

The more we get around among sheet-metal contractors, the more evidence we discover of the growing enthusiasm for Bethcon galvanized steel sheet.

"That coating is terrific," they say.

"Bethcon is strong, but flexible too."

"The way it holds up under tough forming like snap locks or Pittsburgh lock seams!"

"Coating so uniform makes forming easy."

Comments like these can be heard wherever the new Bethcon sheets are in use. And the reason for them is Bethlehem's continuous galvanizing process. In this method, sheet steel receives a zinc coating so tight that severe bending won't crack it, so uniform that any variation in thickness is difficult to measure. And that old-fashioned heavy beading on the drip end is now a thing of the past.

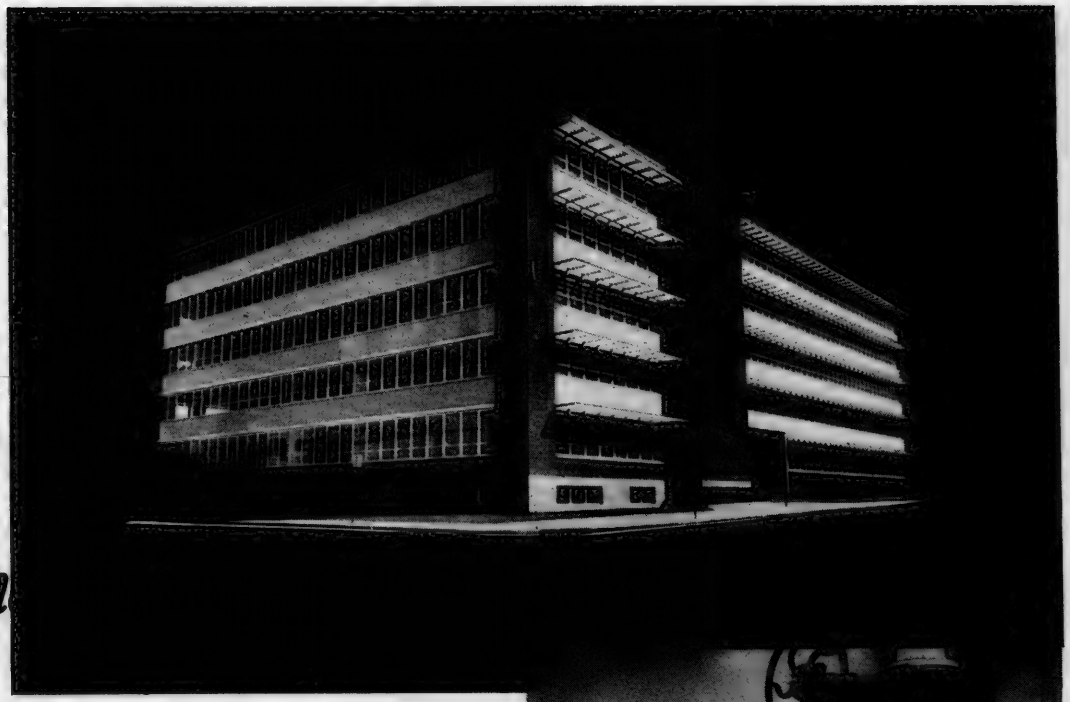
Give Bethcon a tryout in your shops. You can specify it in cut lengths or coils, 14-gage or lighter. You can also choose between plain carbon steel and corrosion-resisting Beth-Cu-Loy (copper-bearing steel) for the base metal, depending on your requirements. Our nearest district office will gladly furnish further details about Bethcon.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



The Stearns-Roger Building, home office of the firm at Denver, Colorado, designed, engineered, and constructed by Stearns-Roger with Mr. J. Roger Musick as consulting architect.

Air Con

and Ingersoll-Rand Centrifugal Pumps play their part . . .

Installations such as this are becoming the rule rather than the exception these days. Even in the cooler areas of the country, office buildings, theatres, shopping centers, restaurants, hotels, hospitals, etc. are catering to the comfort of their employees and customers with central system air conditioning.

Ingersoll-Rand Centrifugal Pumps from ¼ horsepower up are ideal for cooling tower or chilled water service anywhere. These dependable pumps help give indoor comfort day in and day out with minimum maintenance and maximum efficiency.

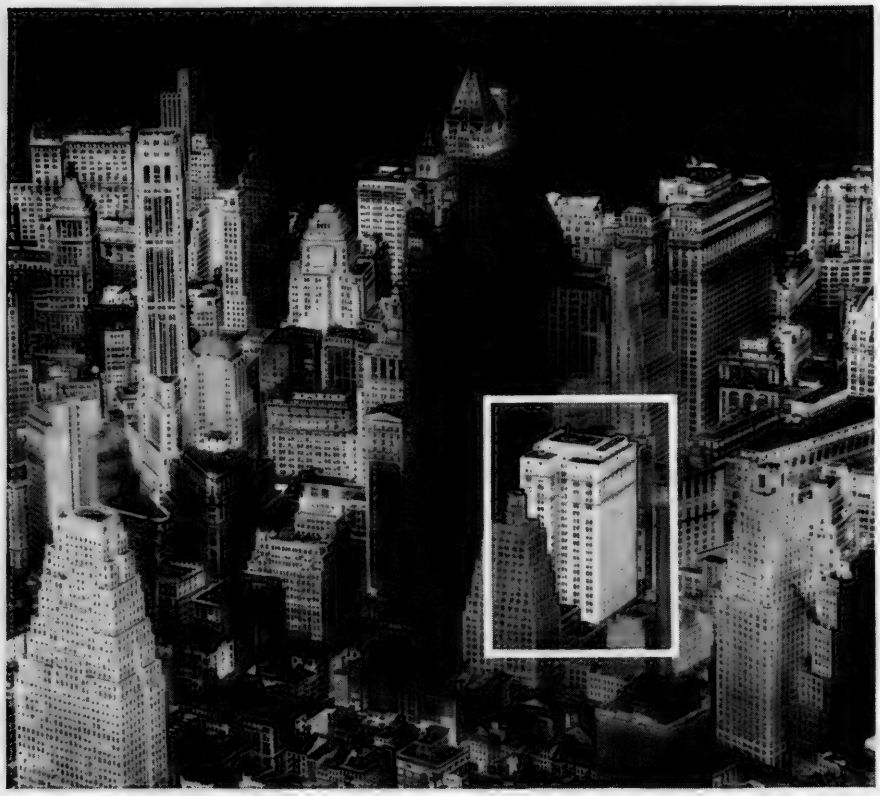
When you are working on an air conditioning job check Ingersoll-Rand Circulating Pumps to do a bonus job for you. In the meantime, write for full information on I-R pumps for air conditioning service. Remember, the job is never too small nor too large for the Ingersoll-Rand Line.

Ingersoll-Rand

9-165 **11 Broadway, New York 4, N. Y.**

An Ingersoll-Rand Class 4CRVL 20 horsepower cradle-mounted pump on cold water circulation service. Delivery 860 gpm—head 55 feet.

An Ingersoll-Rand Class 4DMV 20 horsepower horizontally-split pump on cold water circulation service. Delivery 610 gpm—head 85 feet.



26 Story AMERICA FORE Building at 80 Maiden Lane is located in the hub of New York's financial and insurance district. When built in 1912 it was Manhattan's fifth largest office building

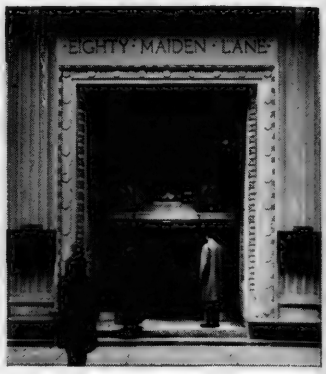
Architects for
Building Modernization:
Cross & Son

Mechanical Engineers:
Meyer, Strong & Jones

General Contractor:
Irons & Reynolds

Mechanical Contractor:
Kerby Saunders, Inc.

All of New York City



America Fore
INSURANCE GROUP

HOME OFFICE

The Continental Insurance Company

Niagara Fire Insurance Company

Fidelity-Phenix Fire Insurance Company

The Fidelity and Casualty Company of New York

Today's **80 Maiden Lane Building** represents one of the largest and most complete reconstruction job attempted in New York City. The building has over 250,000 sq. ft. and is occupied by 2,500 people. It is sturdily built, structurally sound and well located.

Modernization of lighting, heating, flooring, corridors, elevators and other facilities was accomplished without serious interruption of normal growth and expanision during the alterations period.

The **H-shaped** building complicated solar-load effects. Changes in heat gain from the sun were caused by traveling shadows. Fast response of Powers Heating-Cooling Thermostats in air conditioning units compensate for this condition.

Photo shows installation of air conditioning equipment with minimum of disturbance to office employees.

POWERS Air conditioning control system helped transform this 44 year old structure into a comfortable and efficient office building

Productivity of Employees Was Increased 9.3% and there were also fewer errors in the Transcribing Department and less absenteeism and reduced labor turnover, throughout the organization, resulting from more pleasant surroundings and greater thermal comfort. A 1912-vintage heating system was replaced with modern air conditioning . . . controlled by Powers.

Air conditioning system chosen was a 1350 ton high velocity conduit type for the perimeter of the building and a low pressure system for the interior zones.

Over 1600 air conditioning units in the perimeter of the building are controlled by Powers Heating-Cooling Thermostats operating Packless valves. Primary air to these units is supplied by four air conditioning systems. Interior zones of the building are served by seven air conditioning systems which supply tempered and humidified air in Winter and cooled and de-humidified air in Summer.

Powers sub-master room thermostats or type K return air thermostats control interior zone spaces. These instruments schedule the indoor temperature between 72 and 80° F as the outside air varies between 75 and 95° F. One of the 14 Powers Control Panels with Series 100 Temperature Indicating Controllers is shown below on opposite page.

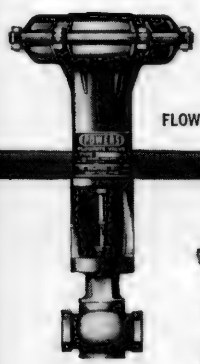
If You Are Planning a New Building, or modernizing an old one, ask your architect to include a Powers Time-proven Quality System of Control. You will insure utmost comfort and lowest operating and upkeep cost.

For further information contact our nearest office

THE POWERS REGULATOR COMPANY

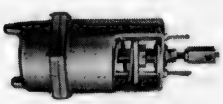
SKOKIE, ILLINOIS | *Offices in Chief Cities in U.S.A., Canada and Mexico*

65 YEARS OF AUTOMATIC TEMPERATURE AND HUMIDITY CONTROL



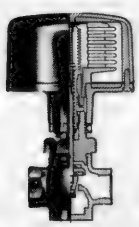
FLOWRITE VALVE

POWERSTROKE MOTORS

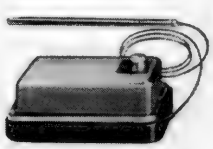


AVAILABLE 3", 4"- 6"

ROOM THERMOSTAT

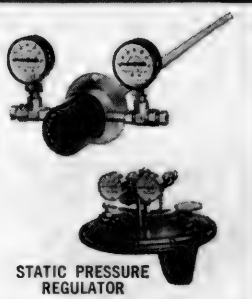


PACKLESS VALVE



HEATING-COOLING THERMOSTAT

LIMITEM THERMOSTAT



STATIC PRESSURE REGULATOR

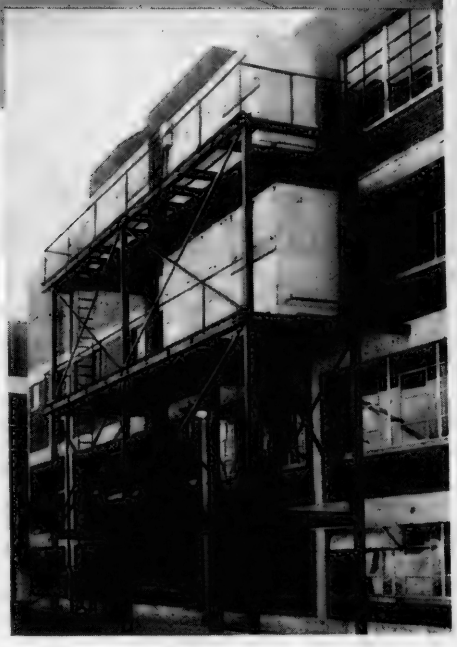
(c83)

Racing enthusiasts watch in cool comfort from *Airtemp air conditioned* clubhouse of Sportsman's Park track in suburban Chicago. *Consulting Engineers, Contractors:* Acme Temperature Control, Chicago.

Airtemp The SURE WINNER at Sportsman's Park...

Cooling with minimum installation time and cost is a sure thing —with Airtemp "packaged" air conditioning. It can be used with or without ductwork... to cool either single areas, or multi-story complete buildings, like the Sportsman's Park clubhouse.

Another example of how Airtemp's *complete* line—286 models, biggest selection of any manufacturer—helps American business and industry solve cooling problems with models specifically suited to particular requirements—at *standard-model cost!* And all engineered by Chrysler.



Outside-mounted Airtemp units—1 60-ton Model 2660, and 2 40-ton Models 2640—*silently* and *unseen* cool the 160,000 cubic foot clubhouse. Evaporative condensers totally eliminate need for cooling towers, drastically reducing installation and maintenance expense.

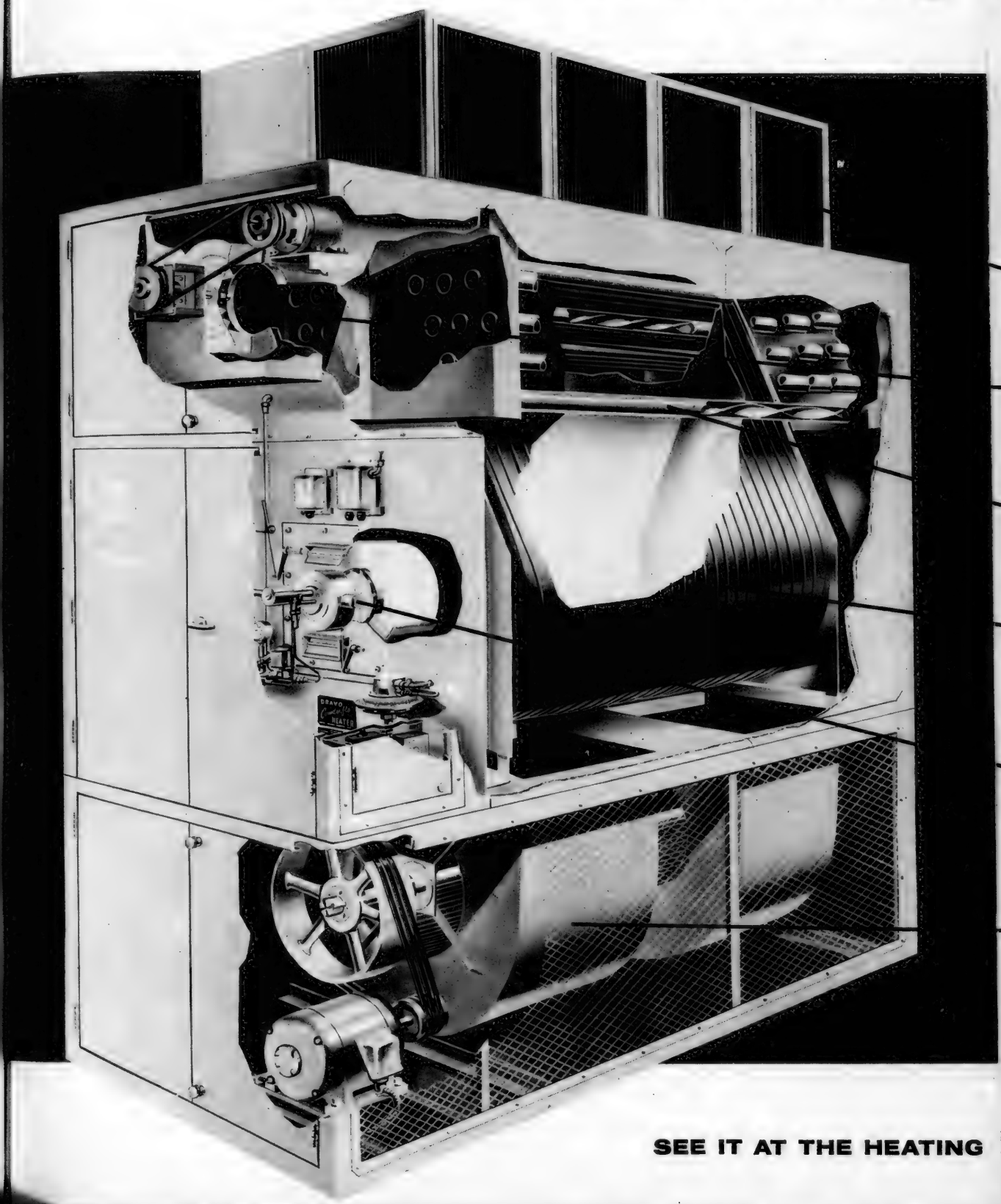
Airtemp CONSTRUCTION
DIVISION OF CHRYSLER CORPORATION

PHONE your nearby Airtemp contractor. He's in the Yellow Pages. Or—write to Airtemp Construction Division, Chrysler Corporation, Dayton 1, Ohio.

A CHRYSLER DIVISION SPECIALIZING IN AIR CONDITIONING FOR EVERY HOME AND BUSINESS NEED

The ALL-NEW DRAVO

with the revolutionary



SEE IT AT THE HEATING A

or

COUNTERFLO HEATER

PYROJET

BURNER

From top to bottom, the NEW Dravo *Counterflo* is built around a completely new concept of burning fuel to produce efficient space heating. The heart of the new heater is the PYROJET burner—the first burner specifically designed for use in direct-fired space heaters. The PYROJET is an exclusive development of Dravo research. Here are a few of the many features of the all-new Dravo:

NEW discharge plenum distributes heat at high velocity without annoying drafts. New design cuts air flow resistance, steps up heater efficiency.

NEW induced draft fan adds to safety by maintaining high negative pressure in combustion chamber, assures accurate flow of combustion air. Positive acting vacuum switch must be closed for burner to operate.

NEW economizer tubes provide high heat transfer to air stream. New location saves space, adds efficiency. Aluminized steel construction for long life.

NEW stainless steel combustion chamber —guaranteed for 10 years—presents perfect airfoil shape to moving airstream. Resistance to airflow is lowered, and heat transfer efficiency raised. Large sizes ribbed to add strength—channel higher air-flow.

NEW PYROJET dual fuel burner—Designed specifically for the New Dravo *Counterflo*, this revolutionary burner offers many features (see box at right) including ability to burn thick No. 5 oil successfully, and automatic switchover from gas to light oil.

NEW low horsepower fans—horsepower requirements in the New Dravo *Counterflo* have been reduced. Forwardly curved, slow-speed, double inlet fans move air efficiently with air/heat ratios of 12,500 cfm to 16,000 cfm per 1,000,000 btu/hr output.

COMPLETE RANGE OF SIZES—from 250,000 to 2,000,000 btu—nine models to suit every type of building—plants, warehouses, schools, offices.

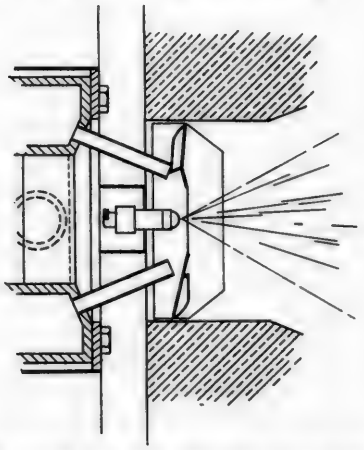
VERSATILE INSTALLATION—can be floor mounted, suspended horizontally or inverted. Adapts readily to use with ductwork if desired.

MAXIMUM SAFETY—completely new electrical system adds to safety, speeds inspection and maintenance. Extremely simple to hook up, or to add additional controls.

NEW DRAVO

PYROJET **BURNER**

"Ring and Finger" design

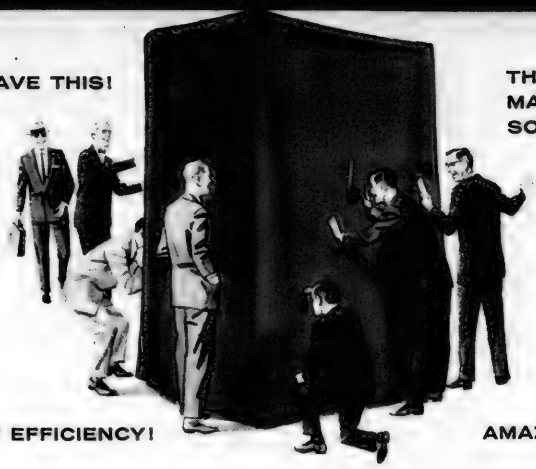


First burner designed specifically for direct-fired space heater, the PYROJET burns oil, gas or heavy oil efficiently in any position.

- Special air-atomizing nozzle *burns heavy No. 5 oil with high efficiency.* Dravo-designed "V-heater" assures quick, smooth starts.
- Provides instant heat.
- Automatically switches from gas to light oil during operation.
- Burner design keeps oil from fouling gas burner.

AND VENTILATING SHOW • *Chicago* • *February 25-28*

or ask your nearest Dravo representative (see list on back) for details



The BIGGEST NEWS in SPACE HEATING

Intensive research developed the many new features of the Dravo Counterflo heater

The new Dravo *Counterflo* heater, with the revolutionary PYROJET burner, is the result of several years of intensive research. It is easy to install, operate and maintain, and will give you many years of safe, efficient heating.

Ask the Dravo representative nearest you. He will be happy to show you how the new Dravo *Counterflo* heater can save you money.

REPRESENTATIVES

BIRMINGHAM, ALABAMA
Clisby and Moore, Inc.
LOS ANGELES, CALIFORNIA
Harry F. Haldeman, Inc.
SAN FRANCISCO, CALIFORNIA
Dravo Corporation
DENVER, COLORADO
Killam Gas Burner Company
HARTFORD, CONNECTICUT
Wilson C. Blake Company
JACKSONVILLE, FLORIDA
Charles H. Liphart & Son
LAKELAND, FLORIDA
Food Machinery Corporation
ATLANTA, GEORGIA
Dravo Corporation
Felix J. Commagere
CHICAGO, ILLINOIS
Dravo Corporation
INDIANAPOLIS, INDIANA
Dravo Corporation
CEDAR RAPIDS, IOWA
Home Equipment Distributing Co.
DAVENPORT, IOWA
Deco Engineering Products
DES MOINES, IOWA
Deco Engineering Products
SIOUX CITY, IOWA
Interstate Air Conditioning Co.
WATERLOO, IOWA
J. A. Neymeyer Company
WICHITA, KANSAS
O'Connor-Ind. Equip., Inc.
LOUISVILLE, KENTUCKY
Ogle Engineering Sales
NEW ORLEANS, LOUISIANA
Bryner-Spranley, Inc.
PORTLAND, MAINE
Crosby & Siegars, Inc.
ELLICOTT CITY, MARYLAND
Dravo Corporation
BOSTON, MASSACHUSETTS
Dravo Corporation
DETROIT, MICHIGAN
Dravo Corporation
MINNEAPOLIS, MINNESOTA
The Gorgen Company
JACKSON, MISSISSIPPI
Harold M. Ludlow
KANSAS CITY, MISSOURI
H. H. Wright Company
ST. LOUIS, MISSOURI
Dravo Corporation
OMAHA, NEBRASKA
Wm. R. White Company, Inc.
BUFFALO, NEW YORK
Engineered Air Associates
NEW YORK CITY, NEW YORK
Dravo Corporation
ROCHESTER, NEW YORK
Engineered Air Associates (SubOff)
SCHENECTADY, NEW YORK
Glenn Davis
SYRACUSE, NEW YORK
Central City Eng. Co., Inc.
GREENSBORO, NORTH CAROLINA
Atlantic Engineering Co., Inc.
FARGO, NORTH DAKOTA
John Holm
CINCINNATI, OHIO
Dravo Corporation
CLEVELAND, OHIO
Dravo Corporation
COLUMBUS, OHIO
I. B. Hutchison
OKLAHOMA CITY, OKLAHOMA
O'Connor-Oklahoma Co., Inc.
TULSA, OKLAHOMA
O'Connor-Oklahoma Co., Inc.
PORTLAND, OREGON
Brod and McClung
ALTOONA, PENNSYLVANIA
Altoona Pipe & Steel Supply Co.
PHILADELPHIA, PENNSYLVANIA
Dravo Corporation
PITTSBURGH, PENNSYLVANIA
Dravo Corporation
CHARLESTON, SOUTH CAROLINA
Charleston Sheet Metal & Roofing
GREENVILLE, SOUTH CAROLINA
Roy A. Stipp
CHATTANOOGA, TENNESSEE
Robbins & Bohr
MEMPHIS, TENNESSEE
Southern Sales Company
AUSTIN, TEXAS
Austin Plumbing Supply Co., Inc.
CORPUS CHRISTI, TEXAS
Allied Plumbing Supply Co., Inc.
DALLAS, TEXAS
Snell Refrigeration Supply
EL PASO, TEXAS
Greenawalt-Ivey & Company
HOUSTON, TEXAS
Dravo Corporation
SAN ANTONIO, TEXAS
Alamo Plumbing Supply Co., Inc.
SALT LAKE CITY, UTAH
Ashton Htg. & Air Cond. Co.
BARRE, VERMONT
Twin City Gasoline Co., Inc.
SEATTLE, WASHINGTON
E. H. Langdon Company
SPOKANE, WASHINGTON
E. H. Langdon Company
PARKERSBURG, WEST VIRGINIA
Wolfe Eng. & Equipment Co.
MILWAUKEE, WISCONSIN
Roloff Engineering Co.

IN CANADA:

TORONTO, ONTARIO
Marine Industries, Ltd.
57 Bloor Street, West
MONTREAL 2, QUEBEC
Marine Industries, Ltd.
1405 Peel Street

DRAVO

DRAVO CORPORATION

Fifth and Liberty Avenues, Pittsburgh 22, Pennsylvania

1. Field proven supercharges for any application—all temperature ranges—all operating conditions.

2. Power element case and stainless steel diaphragm atomic hydrogen welded into one piece. Field tested for over 25 years.

3. External superheat adjustment. (Internal available).

4. External equalizer. (Internal available).

5. Simple cage assembly contains only one packed stem. Replaceable for quick servicing. Interchangeable for wide capacity range.

6. Tight seating—stainless steel stem and seat.

7. Outlet connections to match distributor requirements.

8. Easy to install, light weight flanges—in widest variety of body styles and connections.

12 points of quality in ALCO

"T" SERIES THERMO VALVES

ENGINEERED THROUGHOUT FOR TROUBLE-FREE OPERATION!

9 Rugged come-apart constructions—corrosion-resistant materials.

10 Can be mounted in any position.

11 Simple, compact design — only three major parts—interchangeable to provide wide capacity and operation ranges.

12 Easy to inspect, clean and service without breaking line connections—no special wrenches or gauges required.

BUY QUALITY—BUY ALCO

NON-ADJUSTABLE, HERMETICALLY SEALED MODELS ALSO AVAILABLE

WRITE FOR BULLETIN 171-56

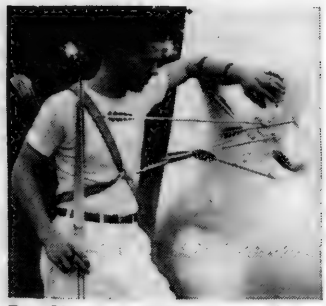
ALCO VALVE CO.

859 KINGSLAND AVE. • ST. LOUIS 5, MO.

The one complete line of refrigerant controls: Thermostatic Expansion Valves, Refrigerant Distributors, Solenoid Valves, Suction Line Regulators, Flooded Evaporator Controls and Reversing Valves.

7217

MODERN ROBIN HOOD FAILS TO FLAKE TI-CO®



Ray Simpson examines arrow holes in TI-CO close up. Not a trace of peeling or flaking of the protective zinc coating.

Ray Simpson, a top-ranking U.S. archer, pumps arrow after arrow into a sheet of Inland TI-CO galvanized steel from a distance of thirty feet.

Despite the terrific piercing impact of steel-tipped shafts traveling at tremendous speeds, the zinc coating on TI-CO stayed put . . . up to the very edge of the holes . . . providing positive protection for the base metal.

If Inland TI-CO can take this kind of punishment without losing the protective quality of its zinc coating, it's a safe bet that it will take even your most severe fabricating operations in stride.

Tough fabricating jobs made easy with non-flaking Inland TI-CO

Intricate parts requiring severe drawing, lock-forming, crimping, punching or welding, which before were impossible for the average sheet metal shop to make with conventional galvanized steel, are no problem with TI-CO galvanized sheets. This is because TI-CO takes the most difficult fabricating operation in stride without flaking of the zinc coating. TI-CO's non-flaking zinc coating eliminates re-dipping and touch-ups and does away with machine down-time due to clogging. Several shops report savings in fabrication costs up to 25%.

The Acme Furnace Fitting Company of Chicago produces 30,000 plenums a year from TI-CO galvanized sheets. These plenums, completely fabricated and assembled, are packed with each furnace of a nationally known manufacturer. Dick Kirk, shop superintendent of Acme, says TI-CO is used exclusively because no other galvanized steel does the job as well.

Shop Superintendent, Laddie Jares of the H. S. Kaiser Co., Chicago, holds filter frame made of non-flaking TI-CO. Photo on left shows frames inside complete air conditioning equipment housing also fabricated from TI-CO galvanized sheets.

Mr. John Styler, Vice-President of the Robert Irsay Company, Chicago, examines construction of soundproof high-pressure air duct fabricated in his shop with conventional equipment. TI-CO takes forming and complicated welding operations with ease. Not a sign of coating failure.

TI-CO is manufactured in coils and cut lengths with oiled or chemically treated surfaces. For the right TI-CO for your needs, consult your local steel distributor or Inland sales representative.

Write today for a free booklet giving complete information.

INLAND STEEL COMPANY

38 South Dearborn Street • Chicago 3, Illinois

Sales Offices: Chicago • Milwaukee • St. Paul • Davenport St. Louis • Kansas City • Indianapolis • Detroit • New York

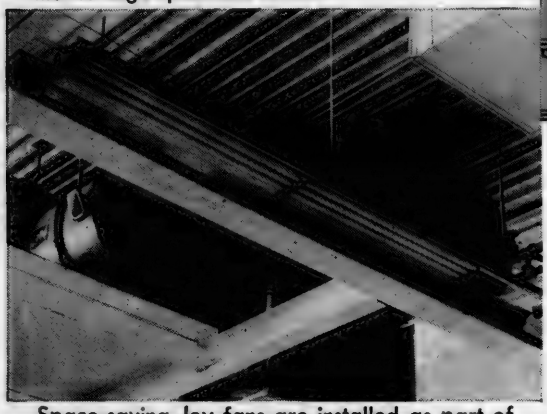
INLAND TI-CO ®

look for this brand—
your assurance of
non-flaking performance

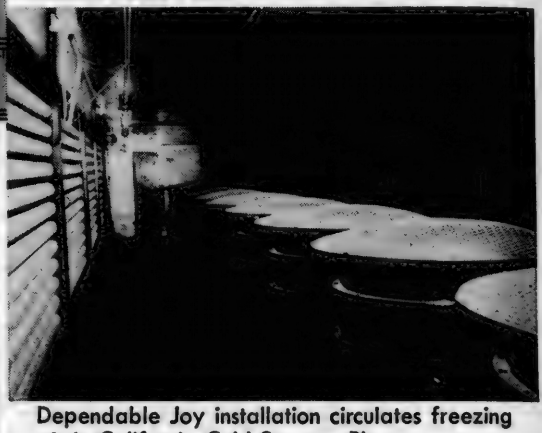
Ventilation Problems: Gone with the Joy Axivane Wind

Compact Joy installation at Boqueron, Venezuela, moves huge quantities of air.

Joy Axivane design means power savings at Alcoa's Texas Plant.



Space-saving Joy fans are installed as part of the duct system at Reliance Electric's Ohio Plant.



Dependable Joy installation circulates freezing air in California Cold Storage Plant.

'Round the World, JOY Handles the Hard Ventilating Jobs

Joy handles the hard jobs in ventilation round the world because a Joy fan develops greater volume of air per pound of fan and motor—because of simplicity of installation that eliminates duct offsets, elbows, drives and guards. The JOY Axivane fan is a favorite of ventilating engineers because JOY installations save up to 70% of the space occupied by other fans of equivalent performance. This space-saving feature of Joy fans makes possible more profit-making production area.

An Axivane fan is an integral part of the duct in which it is installed. Pre-lubricated, double-shielded ball bearings permit the fan to be installed in any position—give you long service without attention. These precision air-moving machines are marvels of efficiency and compactness. They provide economical, efficient air circulation for all types of commercial and industrial applications.

You can choose from a standard line of over 136 models specially designed to meet the needs of modern industry. The Joy Axivane Series 1000 is a standard line available to you ready for installation.

For complete information about the JOY standard line of 136 models—to learn about JOY custom engineering service, write to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario*

Write for FREE Bulletin 17-40

JOY

WORLD'S LARGEST MANUFACTURER OF VANEAXIAL-TYPE FANS

Consult a Joy Engineer

W&D 15840-17

ADSCO

EXPANSION JOINTS

ARE MORE EFFICIENT

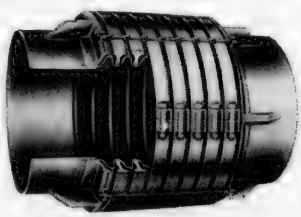
THAN EXPANSION BENDS . . .

and they cost less

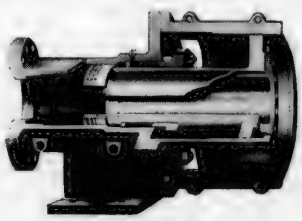
ADSCO Expansion Joints are more efficient than pipe bends for three important reasons:

1. **LESS HEAT LOSS.** A 12-inch line 1000 feet long, carrying steam at 200 lbs. and 550 F, will lose 16% more heat if bends are used instead of ADSCO Expansion Joints.
2. **LESS PRESSURE DROP.** The same line will have a 28% greater pressure drop with bends than with ADSCO Expansion Joints.
3. **LESS SPACE.** One pipe bend requires 100 to 300 sq. ft. of valuable space. An ADSCO Expansion Joint requires little or no extra space.

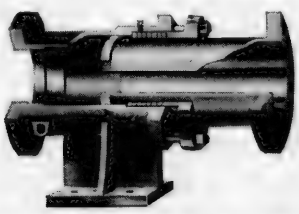
And, in addition, ADSCO Expansion Joints cost less. Used to absorb 4 inches of expansion per 150 feet of 12-inch pipe, an expansion bend, or loop, will cost 50% to 100% more than an ADSCO Expansion Joint. Similar savings can be obtained for other sizes of pipe and for different conditions.



Corruflex Packless Expansion Joint. Requires no maintenance.



Piston-Ring Expansion Joint. Can be unpacked at full operating pressure.



Internally Guided Expansion Joint. Traverses of 4", 8", and 12" per slip.

If you are planning construction of a pipe line, by all means investigate ADSCO Joints. If you already use bends, ADSCO can replace them with joints which will perform better and will still save money.

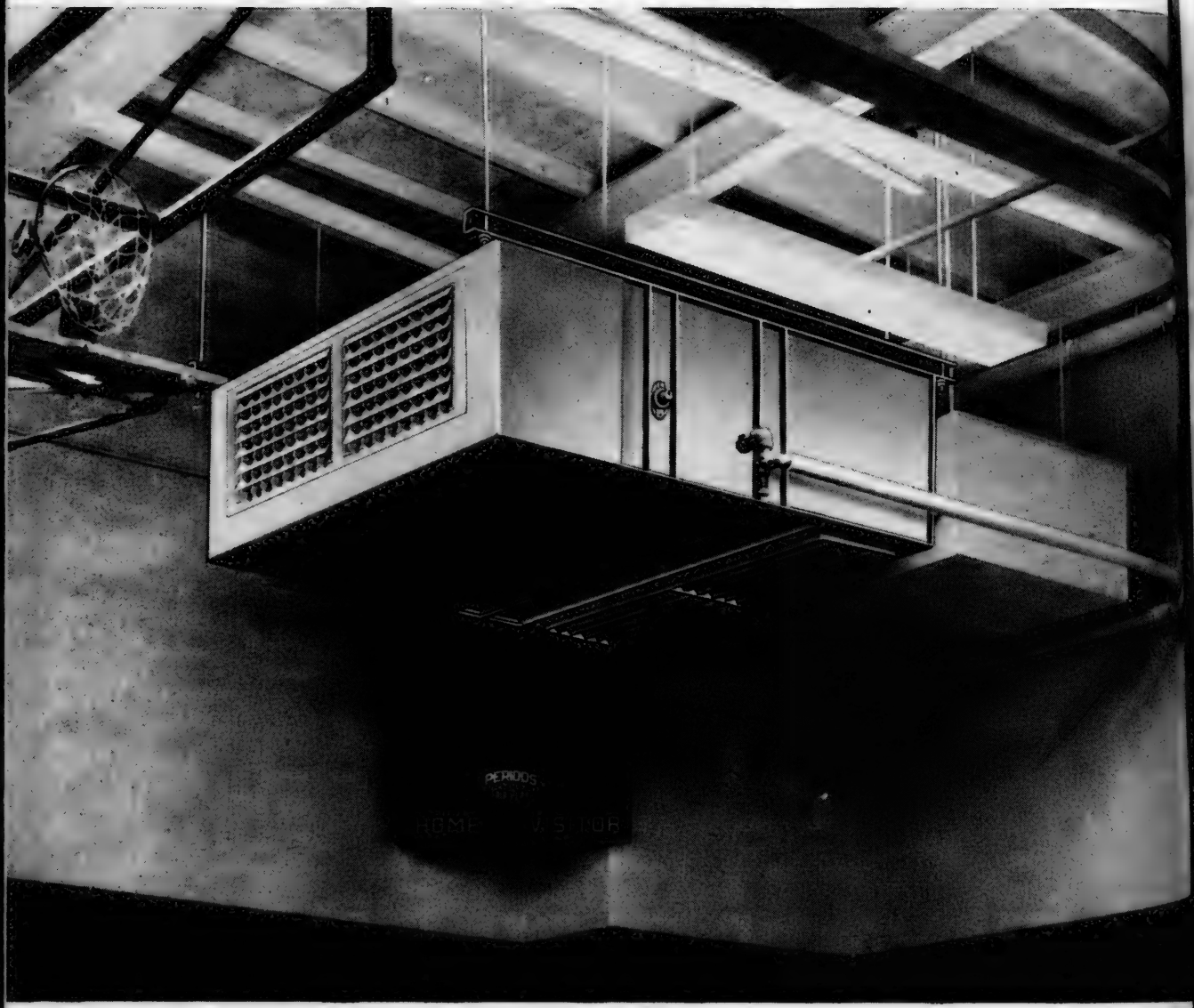
● *Write for Bulletins 54-10 PR and 35-51 PR*

ADSCO ENGINEERED PRODUCTS

AMERICAN DISTRICT STEAM DIVISION
ADSCO INDUSTRIES, INC.
20 MILBURN ST. BUFFALO 12, N. Y.

New models...new sizes...new designs

1957 lines the broades
matched equipmen



Induction UniTrane units

Since its introduction in 1956, the TRANE induction unit has been installed in many leading buildings. Housed in an attractive cabinet so sturdy it can support a man's weight, the unit is trim, compact and efficient. Units may be ordered with or without filters for installations where it is desired to filter *all* the air—not just the primary air. Individually controlled for personal climate preference or changing needs. Available in cabinet or concealed models—for installation on wall, ceiling or floor.

in Trane history: built to work together

See this TRANE equipment at the ASHAE exposition:

- Torrivent heating-ventilating units (shown at left)
- Unit Ventilators in new shelving models
- UniTrane Induced Air units (shown at left below)
- Self-Contained Air Conditioners
- New design in Multi-Zone Climate Changer
- New design in TRANE Steam Specialties

Also: Reciprocating Compressors . . . famous TRANE CenTraVac . . . regular Climate Changer . . . TRANE Radiation . . . Unit Heaters

See all the above at the TRANE *booth, ASHAE Exposition—International Amphitheatre Chicago—February 25 to March 1*

Now—for 1957—TRANE brings you the industry's most complete line of heating, ventilating and air conditioning equipment! New equipment—improved equipment—in even wider ranges of sizes and capacities has been added to the line already famous for its completeness and versatility. And, remember: TRANE offers you matched equipment in all four related fields: air conditioning . . . heating . . . ventilating . . . heat transfer!

TRANE products are designed and built for use together. That means you get greater "system" dependability . . . pinpoints responsibility for *all* the equipment on the job. See the TRANE equipment for 1957 at the ASHAE Exposition in Chicago—February 25 to March 1. If you aren't planning on attending this year, call your nearby TRANE Sales Office for complete information—or write TRANE, La Crosse, Wisconsin.

Torrivent heating—ventilating units

Here's a whisper-quiet centrifugal unit that both heats and ventilates! It's the newly designed TRANE Torrivent—built to furnish large capacity heating and ventilating for all types of buildings. Operation is *quiet*—thanks to new, high efficiency TRANE Fans. Use the Torrivent wherever you need a positive, dependable supply of filtered, humidified and tempered air—fresh or recirculated. Available in 1, 2 or 3 fan models in capacities from 1,250 to 33,000 cfm. Floor, ceiling or wall hung types.

For any air condition, turn to

TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS. • EASTERN MFG. DIV., SCRANTON, PA.
TRANE COMPANY OF CANADA, LTD., TORONTO • 90 U.S. AND 19 CANADIAN OFFICES

This is the TRANE "House of Weather Magic"

—the million-dollar laboratory where TRANE equipment is designed and tested. Built in 1953, the laboratory is now being made still larger, with even more facilities for the development of improved equipment. In this laboratory, terrific extremes of weather are produced—from 65° below to 2500° above! Gales up to 60 miles per hour are created to test fans and other equipment. Whatever the research problem, TRANE seeks sound engineering solutions, based on *facts*.

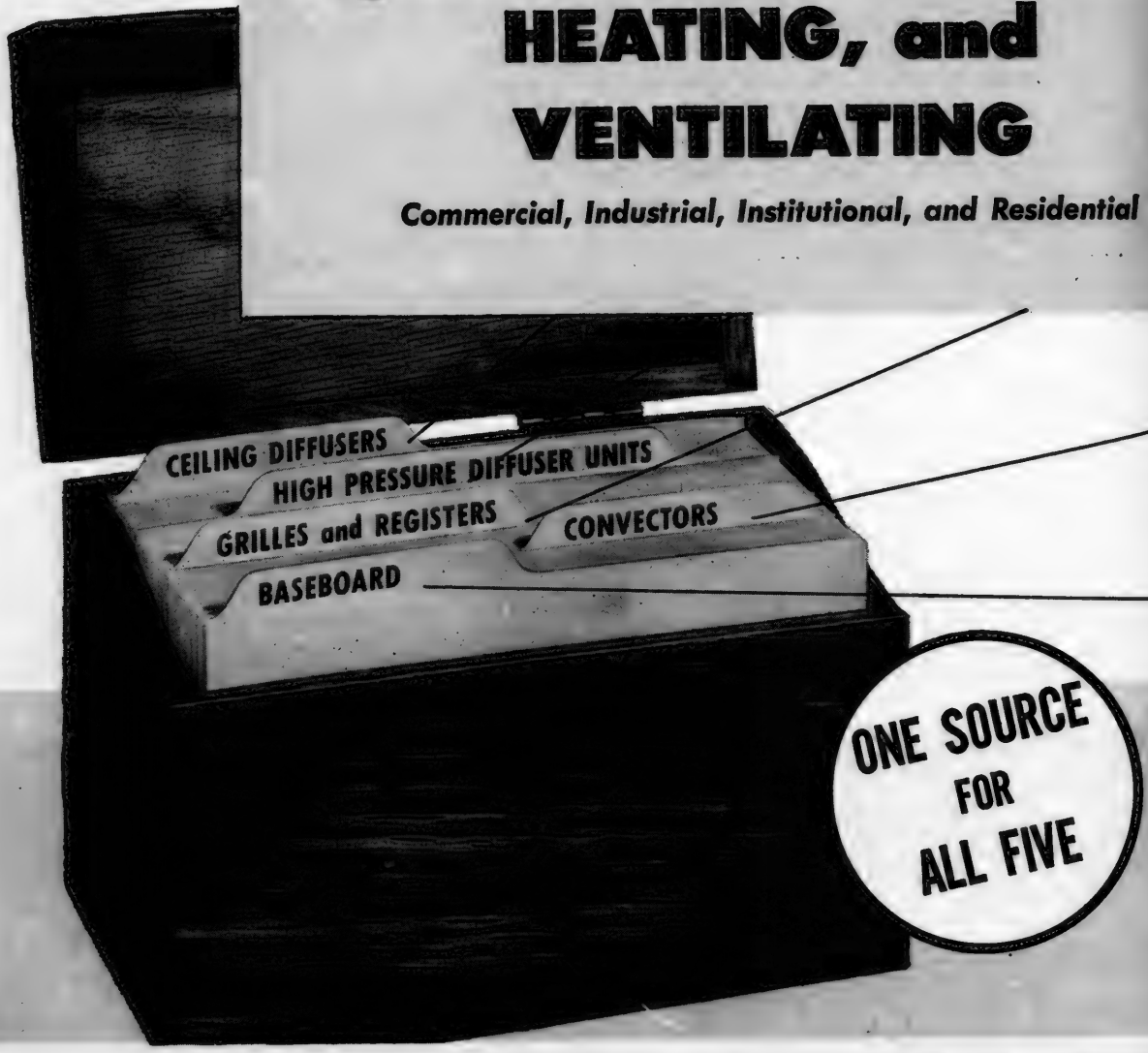
Engineered Products

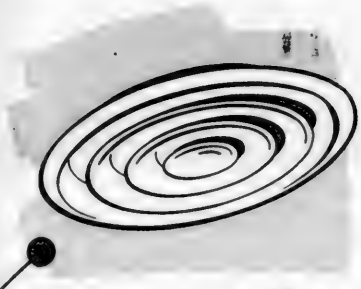
T & B

FOR

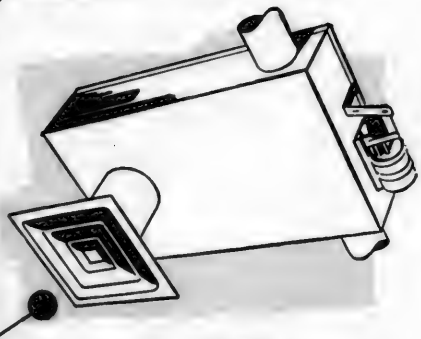
AIR CONDITIONING, HEATING, and VENTILATING

Commercial, Industrial, Institutional, and Residential

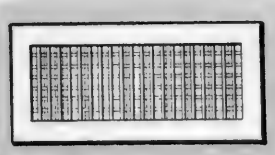




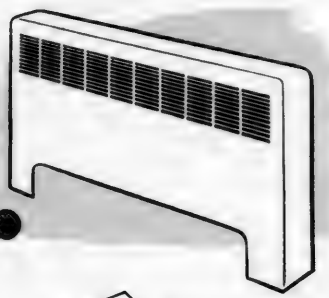
Aerofuse Ceiling Diffusers are available in a wide selection of types and sizes, styled and engineered to meet the most rigid requirements of appearance and performance at the point of air delivery.



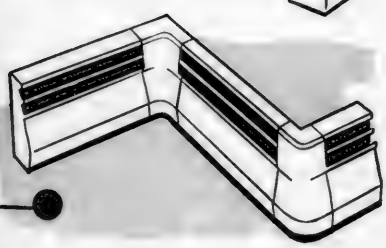
T & B High Pressure Diffuser Units are the result of many years of laboratory experiment and practical experience in the field. Units now in operation handle branch duct velocities up to 4000 FPM, discharge air without noise or drafts.



Tri-Flex Supply Air Grilles and Registers . . . Aerovane Return Air Grilles and Registers. Standard sizes for economy and prompt delivery. Individually adjustable face bars. Registers equipped with opposed blade dampers.



T & B Convectors are widely used in homes and apartments. Two types are available . . . Type R for recessed installation . . . Type F for free standing installation. Styled for beauty, engineered for comfort.



T & B Baseboard combines the heating comfort and smart appearance essential in the modern home. Two types . . . recessed . . . free standing . . . both designed for ease of installation.

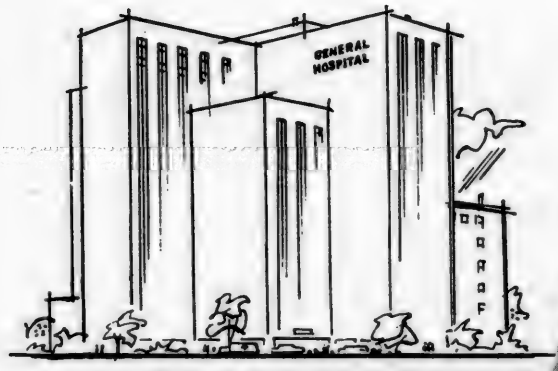
See the
TUTTLE & BAILEY
EXHIBIT
ASHAE Show, Booth 654

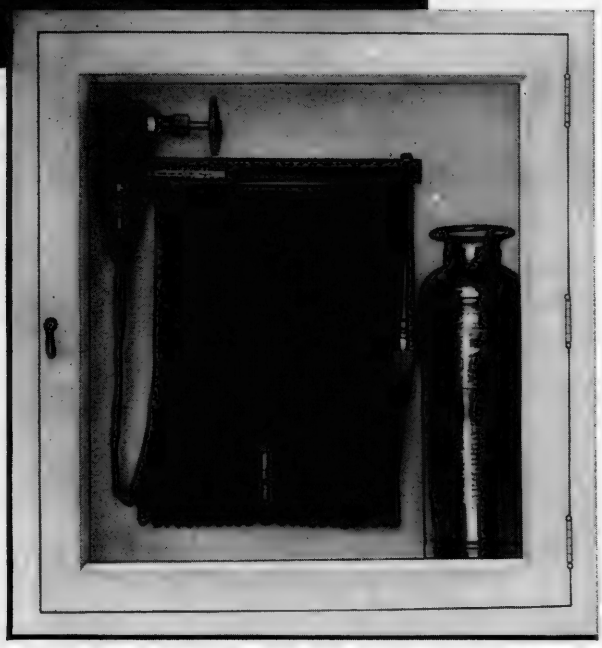
TUTTLE & BAILEY

division of Allied Thermal Corp. New Britain, Connecticut

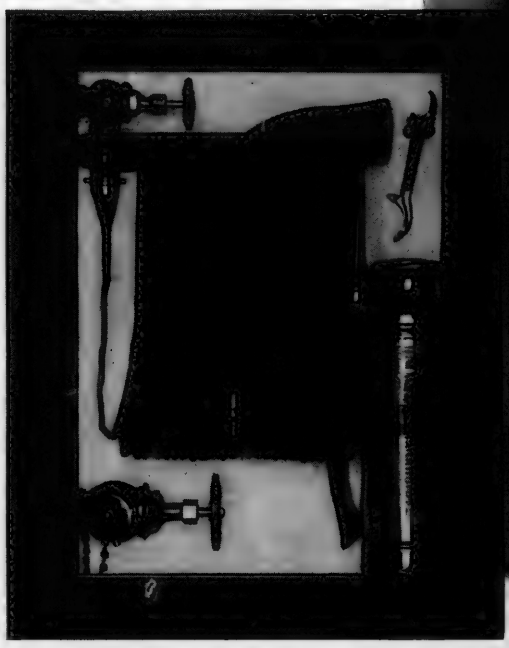
For Interior Fire Protection in Hospitals, Hotels, Apartment and Office Buildings ... Ar

Of the various **ALLENCO** *products and models, these two types are most often used in this field—*





Allenco Unit 215 gives choice of 4 hose-sizes, 4 hose-lengths and other factors.



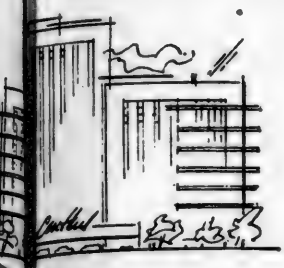
Allenco Unit 192 adds handiest water-source for use by Fire Department.

Cabinets are "custom-sized" and are available in several different groups with Allenco Hollow Steel Door, Nella Sheet Steel Door, Aluminum Doors, and other styles. Rigid and true-to-size, they go in faster . . . look better . . . serve perfectly.

Catalog 150 (A.I.A. file 29e2) contains full details in simplest form, including standard quotable specifications. Write for your copy now . . .

ALLENCO

... Architects, Engineers and Contractors prefer ALLENCO



Some recent installations:

	Hospital	Specifier	Installer	Fieldmen
..., Wash.	Rockwood Clinic	Ellerbee & Co.	Standard P&H	Stan Schafer
..., Ky.	Ad. Bldg., Ky. State Hos.	Southern Engrg.	J. F. Humphrey Co., Inc.	Dick Disney
..., Conn.	Bridgeport Hospital	Hill & Harrigan	Mitchell & Bailey	Harold Jope
..., Tenn.	Mercy Hall Hospital	Harry F. Wilson, Engr.	John F. Whelahan Co.	J. Scruggs
..., La.	Schumpert Hospital	Neil Somdal & Assoc.	Brown & Olds	H. Cunningham
..., Kans.	V. A. Hospital	U.S. Corp. of Engrs.	Farwell Co.	H. Cunningham
..., Nev.	S. Nev. Memorial Hos.	W. Zick, H. Sharp, Archs.	Grinnell Co.	Nic Nicodemus
..., Texas	Mimbres Memorial Hos.	Schaefer, Merrell Assoc.	R. S. Palmer, Inc.	Wm. L. Massey
..., Ind.	Medical Science Bldg., Ind. U. Med. Center	Ammerman, Davis & Stout, Indpls.	Hayes Bros.	Don Davisson
..., N.Y.	Elmhurst Gen. Hos.	York & Sawyer, Arch. Felheimer & Sawyer, Eng.	Joseph F. Egan	Sam Burleigh
Hotels-Apartments				
..., Mo.	Pruitt Housing Jobs (5 Projects)	J. D. Falvey, Cons. Engr.	Gartland Plbg.-Fischer Plg.-Tobin Bros. Plbg.	Ken Williams
..., Conn.	Shelbourne Apts.	J. P. Negnos, Assoc. Engr.	McRory & Marren	Harold Jope
..., Fla.	Florida Shores Hotel	Sherman Assoc. Arch.-Engr.	Town & Beach Plbg.	J. Scruggs
..., Va.	Pentagon Plaza Apts.	Gen. Engrg. Assocs.	Harry E. Nau & Co.	George Fee
..., Ind.	Van Orman N'crest Motel	A. M. Strauss, Inc.	Hipskind P&H	Ted Johnson
..., Calif.	Beverly Hilton Hotel	Welton Becket & Assoc.	Scott Co.	Lang Pratt
Office Buildings				
..., Ore.	Pacific First Fdrl. Bldg.	Kroeker & Assoc. Engr.	A. G. Rushlight & Co.	R. M. Finklea
..., Utah	First Security Bk. Bldg.	W. G. Knoebel, Arch. S. Winburn, Arch.	Utah Const. Co.	J. H. Nicodemus
..., Mo.	Army Personnel Records Center	J. D. Falvey, Cons. Engr.	T. J. Sheehan Co.	Ken Williams
..., Minn.	Hardware Mutual	Richard W. Evans	Cherne-R. L. Anderson	Art Narverud
..., Minn.	Federal Reserve Bank	Richard W. Evans	Mooneys	Art Narverud
..., Miss.	United Gas Bldg.	Wm. Evans, Arch.	So. Central Htg. & Plbg.	John Briant, Jr.
..., La.	Maryland Casualty Bldg.	Curtis & Davis, Arch. deLaureal, Moses, M. Engr.	E. M. Babst, Inc.	John Briant, Jr.
..., Conn.	Highway Dept. Office Bldg.	Hubbard, Lawless & Blakeley	Buckingham & Routh	Harold Jope
..., N. C.	Wachovia Bank & Trust	Jaros, Baum, Bolles, Engrs.	Grinnell Co.	J. Scruggs
..., Texas	Exchange Park Bldg.	Lane & Gambell, Arch. Blum, Guerrero, M. Engrs.	Sam P. Wallace Co.	H. Cunningham
..., Mich.	Ford Motor Co. Bldg.	Smith, Hinchman, Grylls	Viking Sprinkler Co.	Russ Collins
..., Texas	El Paso City-County Bldg.	Monroe, Licht, Higgins	R. E. McKee	Wm. L. Massey
..., Okla.	S.W. Bell Tel. Bldg.	Carnahan & Thompson	Carl Moore Co.	F. Merryman
..., Ind.	Ind. Nat'l Bank Bldg.	Bevington, Taggart, Fowler	Frayn Bros.	Don Davisson
..., N. M.	Simms Bldg.	Flatow, Moore, Bryan & Fairburn, Archs.	Southwest P&H Co.	Cliff Eggers
... City	Socony Mobile Bldg.	Harrison, Abramovitz, Ar. Jaros Baum & Bolles, Engrs.	Eugene Duklawer, Inc.	Sam Burleigh
..., Fla.	Miami Daily News Plant	Weed, Russell, Johnson As. —R. L. Duffer, Mech. Engr.	H. S. Brunson	Bob Selph

Stan Schafer

Ken Williams

Dick Disney

Art Narverud

Harold Jope

John Briant, Jr.

J. Scruggs

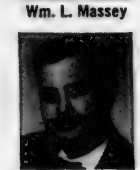
Russ Collins

H. Cunningham

George Fee

Nic Nicodemus

Wm. L. Massey


R. M. Finklea

*** ALLENCO**

Fieldmen, operating from offices in 34 principal cities, offer prompt help. Check "Fire Protection" in your classified phone directory or write for address of nearest office.

W. D. ALLEN MANUFACTURING CO.

[illegible] 700 Allerton Bldg. • 300 W. Lake St. • Chicago 6

QUIET-TESTED EXHAUSTERS

"Given the Works"

BY

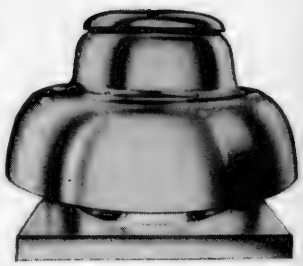
JENN-AIR

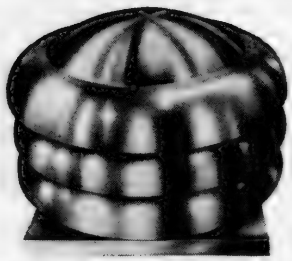
SOUND-ELEC TEST CHAMBER!

Only Jenn-Air Quiet-Tested Exhausters are pre-proved under simulated field conditions. Before leaving the factory, each unit must pass rigid inspection by the critical "Vibronic Eye"—each is line-lab tested by Jenn-Air's Sound-Elec Test Chamber to detect noise, vibration and structural weakness. Only units which pass this inspection are accepted for shipment.

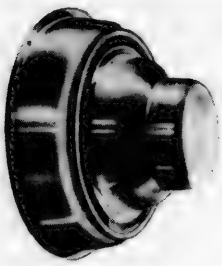
Exclusive U-Spring Suspension of Jenn-Air's *Direct Drive Power Roof Exhauster* virtually eliminates noise caused by vibration. U-Springs suspend the power assembly, isolate it from the base. Motor and blade are balanced together, as a further safeguard against vibration and noise. Heavy gauge all-aluminum housing—non-overloading all-aluminum wheel—assure trouble-free performance. Ball bearing motor is lubricated for 10 years of continuous service.

In this Quiet-Tested *Belt Drive Power Roof Exhauster*, positive weather-proof engineering is combined with trim Low-contour design. Full ball bearing drive and motor are mounted out of the air stream. Heavy gauge all-aluminum construction gives strength without weight. Exhauster can be quickly, easily disassembled for re-assembly on the roof. All standard models come with a disconnect switch as an integral part of the Unit. Non-overloading blade, dynamically and statically balanced, also ensures long life—smooth, quiet operation.

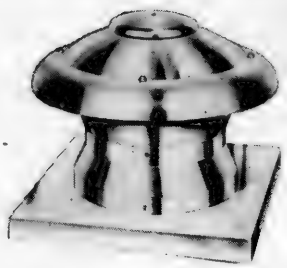




Jenn-Air *Relief Vent and Air Intake*, designed for use where positive pressure is present within the building. Constructed of heavy gauge aluminum. Relief Vent eliminates unsightly gooseneck or hood normally used for air outlet or intake. Outlet area is 100% greater than throat area, thus limiting pressure-loss through Unit to a minimum. Spring loaded or motorized back draft dampers available when specified.



Centrifugal Wall Exhauster. Eliminates most duct work. Provides a means of ventilation through the wall when roof exhausters would prove unsuitable or more costly, as in multi-story buildings. Completely weather-proof all-aluminum . . . unusually quiet . . same non-overloading characteristics as in all other Jenn-Air Units.



Axial-Type Roof Exhauster. Recommended for general ventilation work and duct-type applications where static pressures do not exceed one-half inch. Outstanding features: Special non-overloading design . . . quiet-running pressure-type aluminum blades . . . high-quality all-aluminum construction.

JENN-AIR PRODUCTS COMPANY, INC.

1102 Stadium Drive Indianapolis 7, Indiana

Warehouse stocks in all major cities

Exhausters for Public, Commercial and Industrial Buildings

In JENKINS *Monel-seated Bronze Gates*

THE WEDGE* TAKES THE WEAR - *and spares the rings*

Easy replacement of the wedge only — right on the line — restores full efficiency

THE MONEL SEAT RINGS are expanded into the body to assure a positive, leak-proof joint. Exhaustive tests in typical monel-seated gate valve services show that this permanent all-around support of the rings is essential to guard against deforming, loosening, or shifting.

***THE RENEWABLE WEDGE** (bronze or nickel alloy) has excellent wear resistance, but has a lower degree of hardness than the heat-treated Monel rings, which have optimum resistance to erosion and corrosion as well as abrasion. Thus, wear of the wedge leaves the rings relatively unaffected. When necessary to renew the wedge, you simply remove the valve bonnet, slip the old wedge off the stem, and slip on a new one.

GET PRACTICAL, LOW-COST RENEWABILITY in the valves you choose for the tough, punishing services that require Monel-seated gates. Compare . . . there is nothing simpler, faster, or more economical than Jenkins replaceable wedge design — and you also get the *plus* of Jenkins *extra value* in every other feature. Jenkins Bros., 100 Park Ave., New York 17, New York.

***MADE WITH BRONZE OR NICKEL ALLOY WEDGE**

The bronze wedge provides lasting economy for most applications. The nickel alloy wedge provides extra resistance where rapid wear and corrosion are factors.

JENKINS BRONZE GATES WITH MONEL SEAT RINGS

200 psi	300 psi
Fig. 270-U, Bronze Wedge	Fig. 280-U, Bronze Wedge
Fig. 270-UN, Nickel Alloy Wedge	Fig. 280-UN, Nickel Alloy Wedge
Fig. 270-UL, Bronze Wedge, U.L. approved for L.P.G. Services	350 psi
	Fig. 280-UX, Bronze Wedge

JENKINS BRONZE GATES INCLUDE 40 DIFFERENT PATTERNS

125 • 150 • 200 • 300 • 350 psi SOLID WEDGE • SPLIT WEDGE
SCREWED • FLANGED • SOLDER END • SOCKET END QUICK OPENING

Call your local Jenkins Valve Distributor for complete information.

JENKINS VALVES

LOOK FOR THE JENKINS DIAMOND

SINCE 1864 TRADE JENKINS MARK

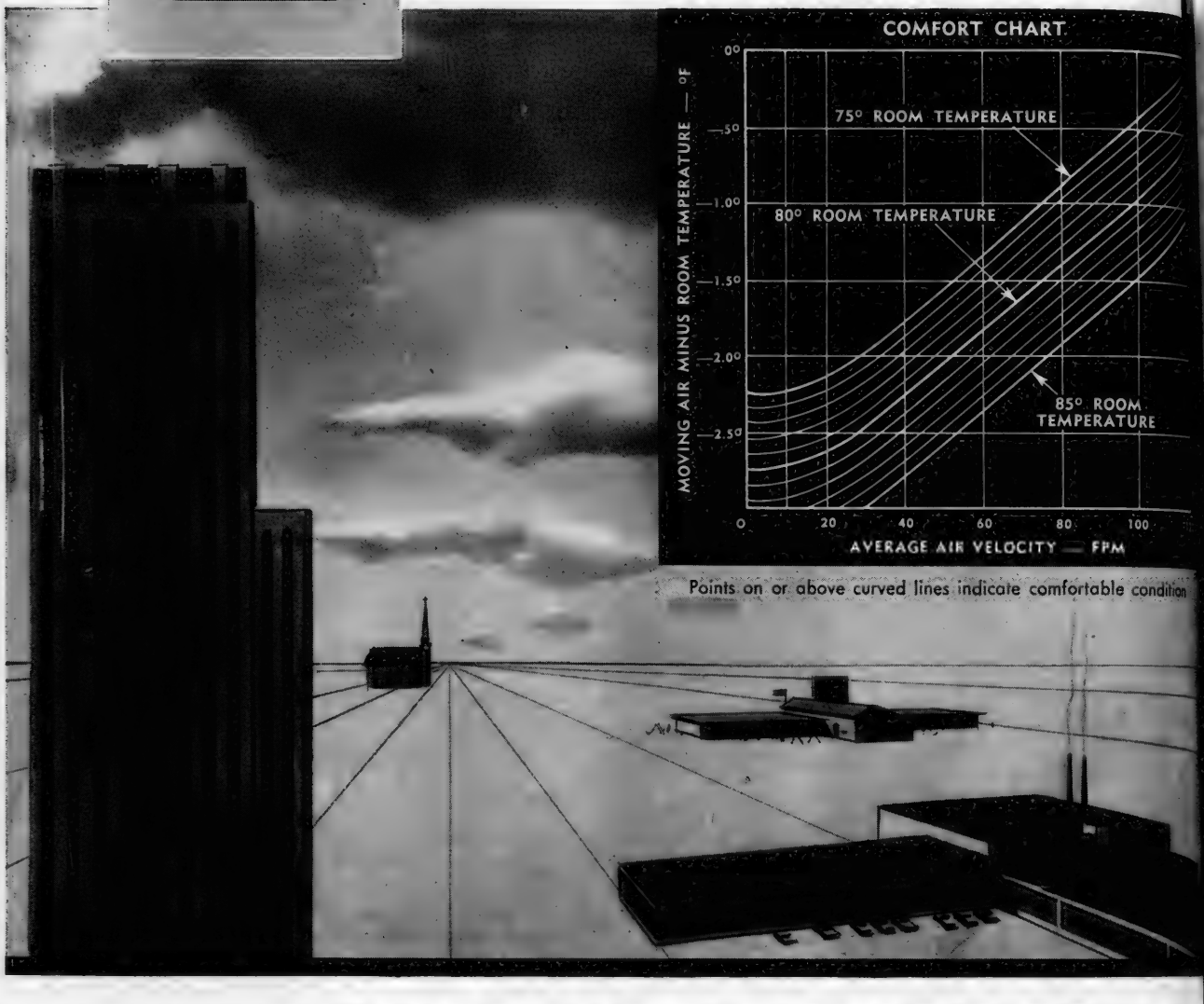
Jenkins Bros

THE MARK OF QUALITY

BARBER COLMAN

Electrionic Automatic Control

for ideal "indoo



Whatever your air conditioning needs, Barber-Colman guarantees results that meet requirements of above Comfort Chart

Creative team engineering at Barber-Colman Company effectively combines the modern advances of automatic temperature controls and engineered air distribution for performance-guaranteed results. Write for descriptive literature . . . or ask your architect or engineer about this exclusive "one responsibility" feature of Barber-Colman products and service.

COMBINED PRODUCTS, COMBINED SKILLS, UNDIVIDED RESPONSIBILITY...
COME TO ONE SOURCE...COME TO.....

.....PLUS Uni-Flo Air Distribution

weather" that's guaranteed!

Barber-Colman combined products assure proper relationship of velocities and temperatures for constant comfort . . .

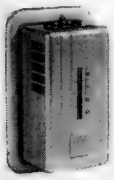
To the occupant of a building, what instantly marks the difference between a properly functioning air conditioning system and a poor one?

The correct system provides draft-free, quiet, *uniform distribution of the air . . . at a constantly held, comfortable temperature,* regardless of outside temperature changes.

The incorrect system varies from "too warm" to "too cool," or "too drafty." Although it may be delivering exactly the same amount of conditioned air, it is not engineered to maintain proper relationship between *velocities* and *temperatures.*

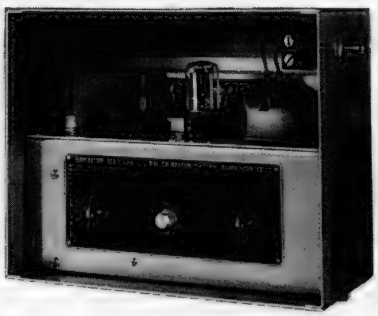
Constant maintenance of this relationship is of extreme importance, because a person's feeling of warmth or coolness is affected by: (1) room temperature, (2) velocity of conditioned air being introduced to the room, and (3) temperature of moving air in relation to average air temperature in the room. To maintain the correct relationship of these variables and stay within the requirements shown in the Comfort Chart at left, there must be closely co-ordinated functioning of the system's *automatic controls and its air distribution units.*

Such performance is assured when you install Barber-Colman Electrionic Automatic Controls and Uni-Flo Engineered Air Distribution. For Barber-Colman has long years of *combined experience* in both automatic controls and air distribution — *and assumes one responsibility* to bring you ideal "indoor weather." Call your nearby Barber-Colman Field Office, or consult your architect or engineer.



THERMOSTATS
Room and remote bulb types.

MOTOR-OPERATED VALVES—Wide range of sizes and types.



ELECTRONIC "CONTROL CENTER"—For completely automatic control from one central point.

Electrionic Automatic Controls

Illustrated here are but a few of the modern automatic controls available from Barber-Colman. This company has a remarkable background in design, engineering, and precision production of fine equipment. Our field staff is widely experienced in solving all types of temperature control and air distribution problems.

UNI-FLO SIDEWALL DIFFUSERS—For quiet, draft-free air conditioning, heating, ventilating. Adjustable air patterns. Various frame styles.

UNI-FLO SQUARE AND RECTANGULAR CEILING DIFFUSERS

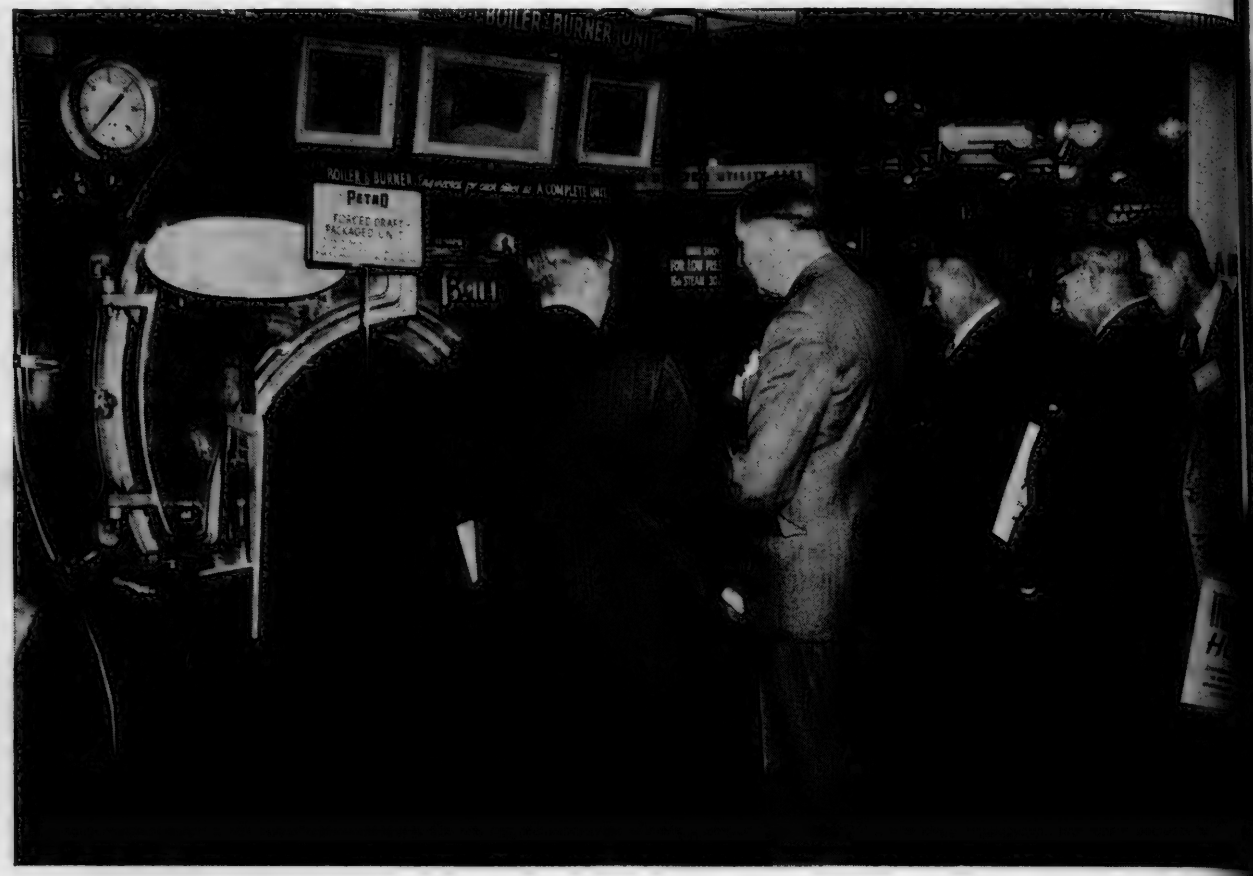
VENTURI-FLO CEILING DIFFUSERS
Uniform comfort, quiet. Air patterns adjust easily after installation.

Uni-Flo Engineered Air Distribution

In addition to Uni-Flo units shown above, Barber-Colman Company produces a complete line of air distribution products for better air handling. Make this your source for reliable performance data and fine-quality equipment . . . take advantage of the continuous flow of new developments from the renowned Barber-Colman Laboratory.

BARBER-COLMAN COMPANY

Dept. N, 1602 Rock Street, Rockford, Illinois



To Know What's New — Means Profits for You

at the

13th INTERNATIONAL HEATING & AIR-CONDITIONING EXPOSITION

(formerly the International Heating & Ventilating Exposition)

INTERNATIONAL AMPHITHEATRE—CHICAGO

FEBRUARY 25—MARCH 1

Under the auspices of the American Society of Heating and Air-Conditioning Engineers, and in conjunction with their 63rd annual meeting.

New money making equipment, new methods, new product information—all this and more will be waiting for you at Chicago. More than 450 companies, showing at the largest exposition of its type in the world, are ready to take the wraps off thousands of **NEW** and improved products that spell profits for **ALL PROGRESSIVE** industrial, commercial and domestic contractors. Come to Chicago —bring your key men too—and know what's new!

Write today for advance registration to:

13th INTERNATIONAL HEATING & AIR-CONDITIONING EXPOSITION
480 Lexington Avenue, New York 17, N. Y.

Management: International Exposition Co.

NEW!

TUBE-TURN* "TAPER FACE" FLANGE

...cuts cost of light-duty piping

...protects low pressure pumps and valves

Tube Turns announces a new lightweight welding neck flange for service up to 125 lbs. W.O.G. pressure, offering two important cost-cutting advantages: (1) It is priced lower than conventional flanges. (2) This lightweight welding neck flange has a tapered face which affords an effective seal with reduced bolt loading; hence, permits use of steel butt welding neck flanges without danger of cracking the flat faced cast iron flanges of valves and pumps used in low pressure piping systems. Here is another result of Tube Turns pioneering research, and an example of how you get *more for your money* when you specify TUBE-TURN Welding Fittings and Flanges and buy them from your nearby Tube Turns' Distributor.

TUBE-TURN

*"TUBE-TURN" and "tt" Reg. U. S. Pat. Off.

The Leading Manufacturer of Welding Fittings and Flanges

TUBE TURNS LOUISVILLE 1, KENTUCKY

A Division of National Cylinder Gas Company

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Cleveland • Detroit • Chicago • Kansas City • Denver
Los Angeles • San Francisco • Seattle • Atlanta • Tulsa • Houston • Dallas • Midland, Texas

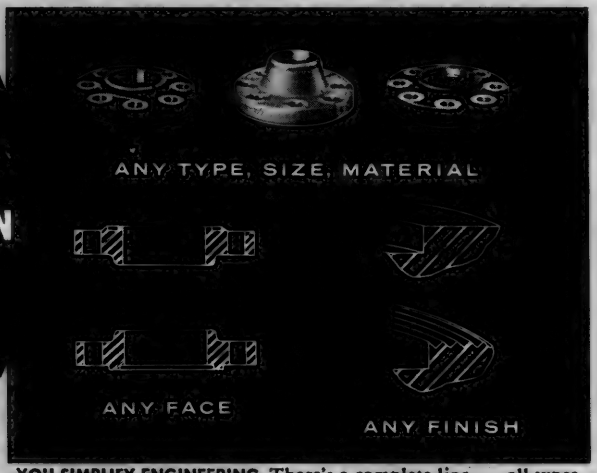
How you cut costs with
TUBE-TURN FLANGES

th the
IEW
aper Face
anges

CUTS FLANGE COSTS. For many applications of light-duty piping . . . up to 125 lb. W.O.G. pressure . . . the new TUBE-TURN Taper Face Flange gives rated performance at a lower price than conventional designs. Here's a good teammate for lightweight pipe and fittings in applications such as water, oil and gas distribution . . . on pumps and compressors . . . any installation where welded piping must be flanged to low pressure valves, pumps or equipment.

PROTECTS VALVES AND PUMPS. Lightweight and tapered face permit good seals with reduced bolt-loading on valve or pump flanges. Lighter, lower-priced valves can be used without danger of cracking their flat faced cast iron flanges. Also, lighter neck of flange speeds up welding to pipe.

ith all
UBE-TURN
anges



YOU SIMPLIFY ENGINEERING. There's a complete line . . . all types, sizes, capacities, materials. You can specify TUBE-TURN Flanges and know you'll get the exact answer to your problem. Also, Tube Turns offers you engineering help.

YOU STREAMLINE PURCHASING. Your nearby Tube Turns' Distributor provides complete-line service. This one source for all your needs in welding fittings and flanges enables you to put *all* your requirements on *one* order . . . to cut red tape, save valuable time.

TUBE TURNS, Dept. B-1
224 East Broadway, Louisville 1, Kentucky
Please send free Bulletin on Taper Face Flanges.

Company Name _____
Company Address _____
Your Name _____
Position _____
City _____ *Zone* _____ *State* _____

Available from your nearby TUBE TURNS' distributor

*"TUBE-TURN" and "tt" Reg. U. S. Pat. Off.

TUBE TURNS
LOUISVILLE 1, KENTUCKY
A DIVISION OF NATIONAL CYLINDER GAS COMPANY

New York • Philadelphia • Pittsburgh • Cleveland • Detroit
Chicago • Kansas City • Denver • Los Angeles • San Francisco
Seattle • Atlanta • Tulsa • Houston • Dallas • Midland, Texas

AIRCOUSTAT SILENCES ALL FREQUENCIES IN THE AUDIO-FREQUENCY RANGE!
Resonators hold low-frequency sounds
Periodic internal structure dampens middle-frequency noise
Sound-absorbent materials suppress high frequencies

AIRCOUSTAT* Sound Traps eliminate air conditioning noise at 50% less cost

Acoustical Performance Guaranteed. Easy to Install. Pre-Engineered — No Design or Layout Headaches.

Revolutionary AIRCOUSTAT Sound Traps require no special tools for installation . . . reduce your labor costs and lower your installation time. Units fit any size or shape of duct. If AIRCOUSTAT fits *geometrically*, it fits *acoustically*.

AIRCOUSTAT is the most efficient method of sound-deadening you can provide your customers. A 7-foot AIRCOUSTAT unit suppresses as much sound as 100 feet of ordinary duct lining. AIRCOUSTAT eliminates all frequencies in the entire audio-frequency range, silences entire systems or selected outlets. Flow resistance and pressure drop are lower. 4 series cover applications ranging from general offices to recording studios.

Discover how AIRCOUSTAT Sound Traps can save you time and money . . . create greater customer satisfaction.

**Koppers Trade Mark*

KOPPERS **INDUSTRIAL SOUND CONTROL**

Engineered* Products Sold with *Service

MAIL THIS COUPON TODAY

KOPPERS COMPANY, INC., Metal Products Div., Industrial Sound Control Dept., 6302 Scott St., Baltimore 3, Md.
Gentlemen: Please send me a free copy of your booklet on AIRCOUSTAT Sound Traps.

Name..... Title.....

Company.....

Address.....

City..... Zone..... State.....

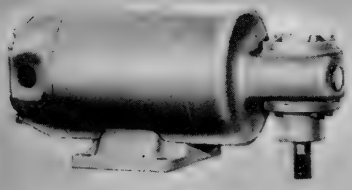
when you need a *Special* motor...contact DOERR

Over 95% of Doerr's production consists of motors with one or more special features

Rely on Doerr's long and specialized experience to solve your problems. List your specifications. Then let Doerr prove how easy it is to select and receive on-time delivery of motors that *exactly* fill your need.

Special features and modifications of all types are available. Present castings, windings and mountings can be adapted to solve new design problems at minimum cost. In addition, Doerr makes a complete line of standard NEMA ratings, every motor precision-built to the highest standards of quality.

Discover now why leading machinery builders consistently re-order Doerr Motors. Before you buy, just write or call us in for a talk. More than likely we can furnish the top-quality power package you want.

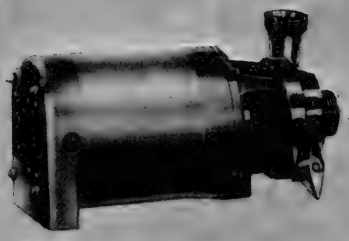


Gearmotor for agitator drive on bulk milk cooler. Stainless steel shaft. Leak-proof seal.

Special diameter motor parts for use in rotary oil burners. Range ½ to 5 HP.

Floor machine motor. Low contour—high torques—pleasing appearance.

Doerr motor with special mounting used on leading 10" tilting arbor saw.



Sanitary dairy pump motor . . . Doerr-Designed to customer's specifications.

Special pump bracket eliminates mounting and alignment problems. Saves space and weight.

Special and standard electric motors from 1/30 to 5 HP that exactly meet your needs.

You Get MORE with Doerr!

See us
BOOTH 561
Chicago Heating and Air-Conditioning Exposition
February 25-March 1

DOERR
Electric Corporation
CEDARBURG, WISCONSIN

Brunner offers the right H.P. HORSEPOWER for every Refrigeration and Air Conditioning Job

The Brunner line of Refrigeration and Air Conditioning Condensing Units offers a wide horsepower range . . . the right size for every job . . . from ¼ H.P. through 100 H.P.

Build more sales with the complete Brunner line, backed by a nation-wide net-work of over 180 Brunner Supply Depots

BRUNNER MANUFACTURING COMPANY, UTICA, N.Y.
The Brunner Co., Gainesville, Ga.
In Canada: Brunner Corp. Canada Ltd., Toronto, Ont.

BRUNNER
SINCE 1906

BRUNNER-METIC (trade marked) Refrigeration Condensing Units from ¼ H.P. through 3 H.P.

OPEN-TYPE Condensing Units available from ¼ H.P. through 100 H.P.

BRUNNERIZE FOR DEPENDABLE REFRIGERATION AND AIR CONDITIONING

Now! HONEYWELL makes an

To aid the engineer, Honeywell makes a complete range of Electronic Air Cleaners for any type of air conditioning or ventilating system. Each installation begins with the single-cell unit (inset). Number of cells is determined by amount of air handled by the system. The photograph illustrates the building-block technique employed for a typical installation of moderate size. This *module construction* makes installing and servicing easy.

• • •

See the Honeywell Electronic Air Cleaner on display at the 13th International Heating and Air Conditioning Exposition (ASHAE)—Booth 917, International Amphitheatre, Chicago, starting February 25.

ELECTRONIC AIR CLEANER

From the leader in automatic controls for air conditioning comes another progressive step toward ideal control of indoor climate

THE ELECTRONIC Air Cleaner is the most recent addition to Honeywell's world-famous line of products for the control of indoor comfort.

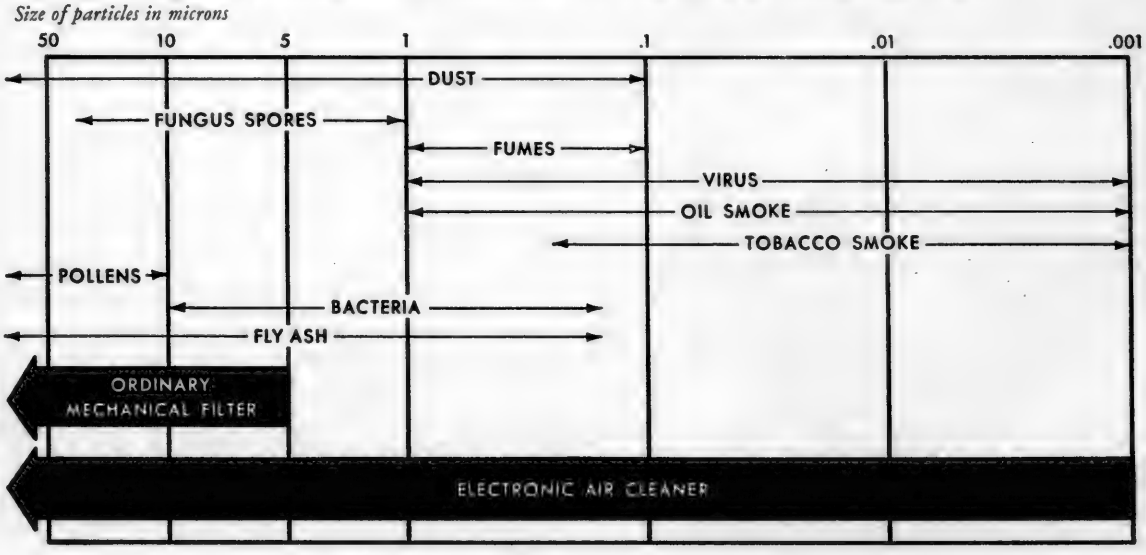
With its introduction, Honeywell's reputation for quality and dependability becomes identified with the most efficient method commercially available for ridding the air of undesirable foreign particles.

This means that now you can confidently assure your clients freedom from the costly scourge of air-borne dirt—freedom that ordinary impingement-type filters can never provide. The superiority of electronic air cleaning is described graphically below, suggesting that a Honeywell Electronic Air Cleaner installation begins to amortize itself immediately.

And of course, because this is a Honeywell product, you can expect and get nation-wide service from reliable field engineers who talk your language.

For complete information on the Honeywell Electronic Air Cleaner, call your local Honeywell office. Or write to Dept. HV-2-54, Minneapolis 8, Minn.

Efficiency Comparison of Electronic Air Cleaner and Mechanical Filter



Note: Particles smaller than 10 microns are invisible to human eye

As shown above, common air-borne contaminants range in size from beyond 50 to .001 microns. In this area lie dust, pollens, fungus spores, bacteria, fly ash, fumes, oil smoke, virus and tobacco smoke. It should be noted that the ordinary mechanical filter removes very few of the air-borne particles of less than 5 microns in size. But notice the wide range of protection offered by the Honeywell Electronic Air Cleaner. Here you get not only the removal of the large coarse particles, but the microscopic ones, as well—a major cause of soiling and many respiratory ills.

MINNEAPOLIS **Honeywell**

112 offices across the nation

So Halstead & Mitchell engineers said:

A BEARING ON COOL[illegible]VER PERFORMANCE'

Nothing has more bearing on cooling tower performance and life than do tower fan bearings. On them turn the induced draft cooling tower's *only moving parts.*

Announcement by Halstead & Mitchell engineers of a *permanently* sealed and lubricated fan bearing means a bearing so designed as to completely eliminate moisture —and consequent rusting of the bearing balls and races. The *elimination of periodic greasing* cuts your tower maintenance costs to an absolute minimum . . . literally adds years to cooling tower life.

With not a single bearing failure reported from the hundreds of these "new bearing" towers in actual use, Halstead & Mitchell offers you . . . now more than ever . . . the best buy in cooling towers on the market today

SUPER-QUIET, 4-BLADE FANS, TOO!

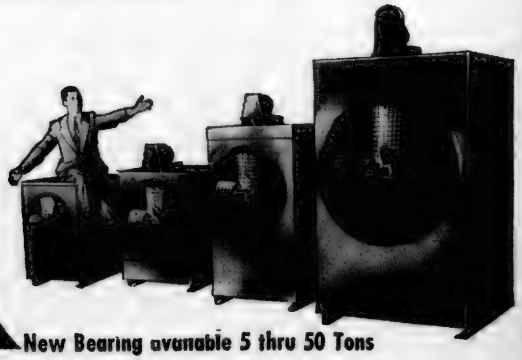
There are new fans, too, on Halstead & Mitchell Cooling Towers—deep-pitch fans which operate at much, much lower speeds—actually *cut cooling tower noise level in half.* Sturdy, stainless steel fan blades . . . stainless steel fan shafts . . . make sure your tower will have not only a quiet life, but a long one, too!

For Complete Details, Write for Bulletin CT-584

HM

Halstead & Mitchell

BESSEMER BUILDING, PITTSBURGH 22, PA.



New Bearing available 5 thru 50 Tons

SANTA ROSA HOSPITAL
San Antonio, Texas

Architect:
Phelps, Dewees & Simmons

Engineer:
Gerard M. Baker

Heating Contractor:
Jud Plumbing & Heating Co.

"the second control more than pays for itself"

HERE you see the utmost in boiler water level control keeping excellent company. Those No. 150 Pump Controllers and Low Water Cut-offs are installed on two large modern Kewanee firebox boilers in the boiler room of a big new addition to San Antonio's already large and famous Santa Rosa Hospital.

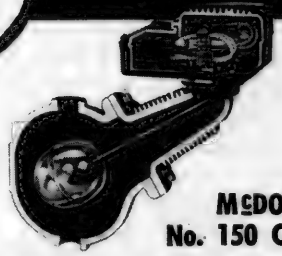
The men and firms who turned out this commendable job are listed above. An interesting aspect of the engineering is the use of two McDonnell No. 150 Controls on each boiler; one positioned higher than the other; the upper control used solely to control the feed pump; the lower, solely as a low water cut-off to stop the gas burner.

In a letter from the heating contractor, the reason for this arrangement was given: When the controls were installed, it was decided that local conditions would produce considerable fluctuations in the boiler water level which would often cause the low water cut-off switch to stop the burner when there was no actual condition to warrant cutting off. By setting the low water cut-off so that it will stop the burner only when there is a serious low water condition, unnecessary service calls are avoided. As a result, says the letter, "the second control more than pays for itself."

The resourcefulness to meet special conditions in a practical way is characteristic of men who know their heating and equipment. So it is not surprising to find McDonnell equipment in so many of these well engineered, capably-executed installations.

McDONNELL & MILLER, *Inc.*, 3500 N. Spaulding Ave., Chicago 18, Ill.

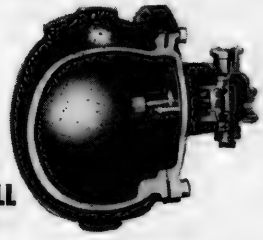
Doing One Thing Well



McDONNELL
No. 150 Control

Maximum Steam Pressure, 150 lbs.
Underwriters' Listed

Holds boiler water level within the close limits that assure maximum steaming efficiency and fuel economy. Ask for complete set of installation and wiring diagrams covering both single and battery boiler jobs.



McDONNELL
No. 27T

Make-up Water Feeder

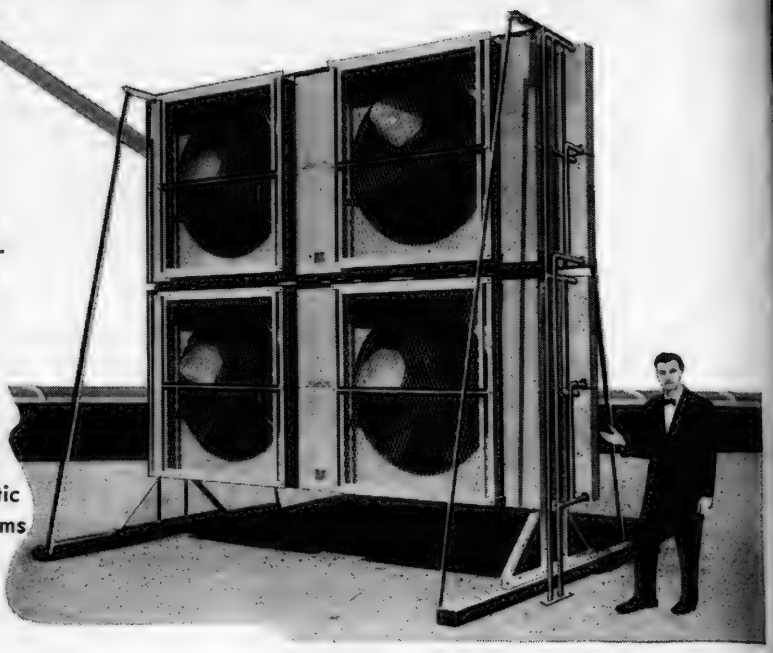
An excellent team-mate for the No. 150, this McDonnell make-up water feeder is mounted on the receiving tank to maintain a minimum water level at all times.

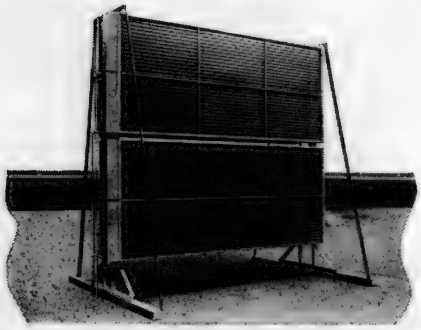
McDONNELL

Water Level Controls

KRAMER UNICON GETS BIGGER and BIGGER

There is only one answer to large capacity condenser problems — the KRAMER UNICON. Every day more engineers plan larger tonnage installations — 50, 100 and even — 800 tons. And every day UNICONS are shipped to all parts of the world for giant-sized installations. No other air-cooled condenser can match the long, successful record of UNICON, backed by thousands of applications since 1937 — in the widest range of tonnages and climatic conditions. Your condensing problems can be best answered by use of the best — the KRAMER UNICON.





Space-saver UNICON, *as illustrated,* serves a 60-Ton air conditioning system, yet takes but 70 sq. ft. of roof space.

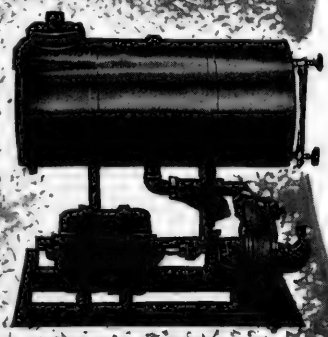
UNICON is a remote-type air-cooled condenser that requires no water. KRAMER UNICON can be used with any size compressor, REGARDLESS of horsepower. Any size refrigeration or air conditioning system can be air-cooled with UNICON, REGARDLESS of tonnage. UNICON requires less horsepower, less piping, is easier to install and costs less. KRAMER UNICON performs best — even in semi-tropical climates.

WRITE FOR BULLETIN U-210D

KRAMER TRENTON CO. • Trenton 5, N.J.

SPECIFY WITH CONFIDENCE

There's a Skidmore Pump designed for each and every heating requirement.
Write for bulletins



TYPE "TM"

Completely assembled on either steel or cast iron base —capacities, for boilers up to 250 H.P., with discharge pressures to 150 lbs.

TYPE "HS"

Sturdily constructed for dependable service at small investment — capacities 1,000 to 65,000 sq. ft. E. D.R., discharge pressures from 10 to 75 lbs.

VACUUM TYPE

Automatically adjusts itself to the varying conditions of the system. Efficiency maintained. Capacities ranging from 5,000 to 100,000 sq. ft. E.D.R.

TYPE "UV"

Designed for low return installations — capacities, 2,000 to 40,000 sq. ft. E.D. R. and discharge pressures from 10 to 75 lbs.

SKIDMORE CORPORATION, ST. JOSEPH 5, MICHIGAN

Please send bulletins on the following pumps checked below.

VS TM HS UV VACUUM

.....

.....

.....

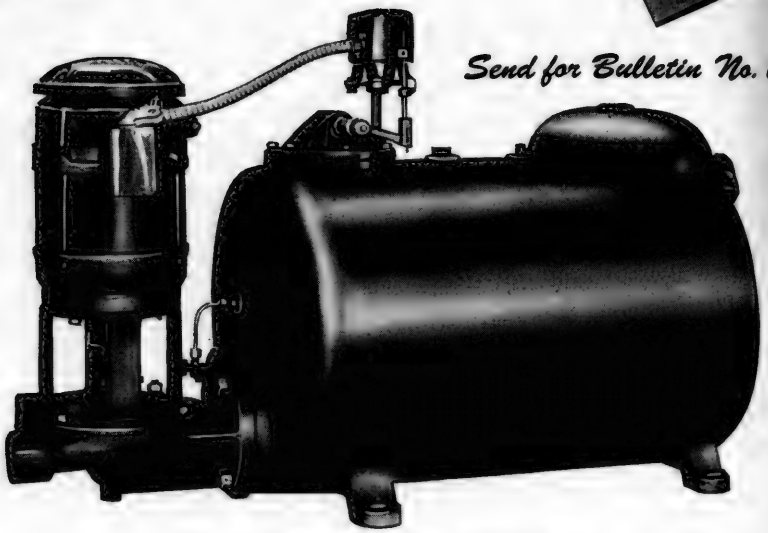
..... State.....

Skidmore Pumps

Here are the answers to— your Heating Pump Problems

Send for Bulletin No. 10-

- **Quiet Operation**
- **Low Inlet Connections**
- **Accessibility for Inspection**



TYPE "VC" SINGLE UNIT

Condensation Pump and receiver has low inlet connection . . . operates quietly . . . impeller is bronze centrifugal enclosed type. Especially designed for handling hot condensate, entire unit can be removed for inspection without disturbing piping.

All Skidmore Pumps are furnished in either single or duplex type according to installation requirements.

For complete information call or write your nearest Skidmore Pump Representative.

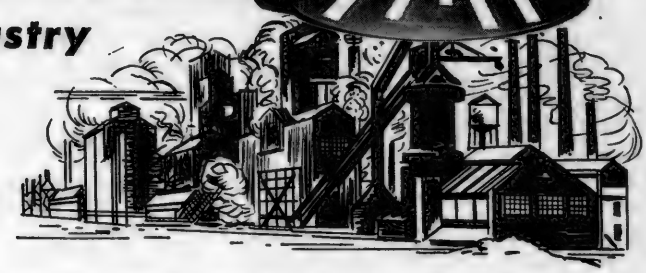
MORE FAMOUS SKIDMORE PUMPS

SKIDMORE CORPORATION • ST. JOSEPH, MICHIGAN

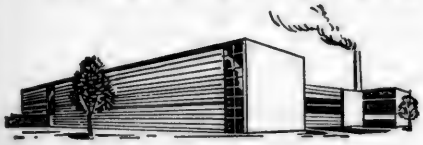
Quickdraft...

the world's most efficient power exhauster

...for industry

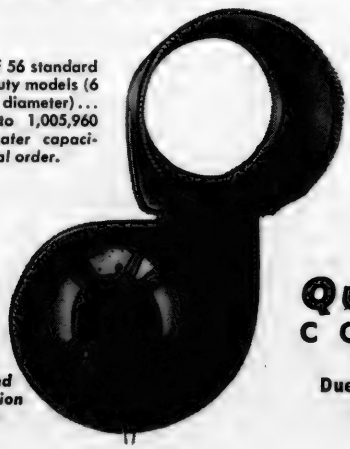


...for institutions



...for residences

Capacities of 56 standard and heavy duty models (6 to 30 inches diameter)... 8,400 CFH to 1,005,960 CFH . . . greater capacities on special order.



★ NO MOTORS, FANS OR BEARINGS IN EXHAUST LINE

★ NEEDS NO STACKS

★ ACID RESISTING VITREOUS ENAMEL FINISH

FOR INDUSTRY, Quickdraft excels in venting paint booths . . . abrasives . . . corrosive gases . . . noxious fumes . . . high temperatures and moisture. Its blower operates in clean or outside air. It eliminates down-time for cleaning and replacing fan blades. It improves industrial venting and reduces maintenance costs!

FOR INSTITUTIONAL AND COMMERCIAL BUILDINGS, Quickdraft efficiently vents heating plants, water heaters and incinerators at roof level. It saves the cost of building unsightly tall stacks.

FOR RESIDENCES, Quickdraft makes low, cold and erratic chimneys function. On and off with the fire, Quickdraft maintains constant draft required for efficient and economical combustion of all fuels. It eliminates pulsating or chattering, puffing, smoking and sooting.

SEND FOR QUICKDRAFT ENGINEERING DATA ON YOUR VENTING OR HEATING APPLICATIONS . . . TODAY.

See our display
Booth No. 717
International Heating and Air Conditioning Exposition
Chicago . . . February 25 to March 1, 1957

Quickdraft
COMPANY
P. O. Box 87-O
Dueber-Hampden Bldg.
Canton 1, Ohio

N-899-QD

Quickdraft Company
P. O. Box 87-O • Canton 1, Ohio
Please send Quickdraft engineering data for

- ☐ Industrial Exhausting
- ☐ Commercial Heating Plant
- ☐ Residential Heating Plant

Firm _____

Individual _____ Title _____

Street _____

City _____ Zone ___ State _____

B&G PRESENTS...

three new or improved units for better boiler protection

B&G SYSTEM SAVER

Complete protection for hot water boilers

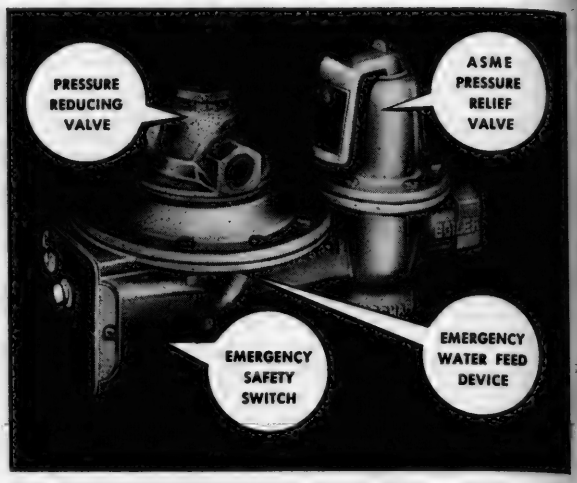
Four utility and safety devices combined in a single, easy-to-install unit.

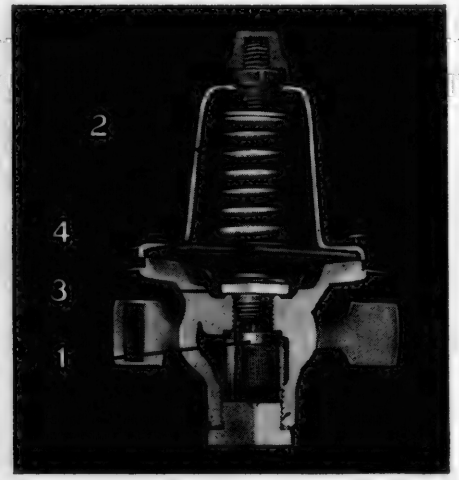
1. Automatically fills the system. *Pressure Reducing Valve* maintains water pressure in the system at all times, minimizing troubles caused by air in the system.

2. Automatically prevents excessive boiler pressures. *ASME Pressure Relief Valve* is designed to exceed ASME Code requirements! Resilient Silicone valve face assures tight seal.

3. Automatically shuts off burner. *Emergency Safety Switch* breaks electrical current if other controls fail. Switch must be re-set before operation can resume.

4. Automatically adds cooling water to boiler. *Emergency Water Feed Device* opens pressure reducing valve wide to keep boiler full of water if burner fails to shut off below 260°F.



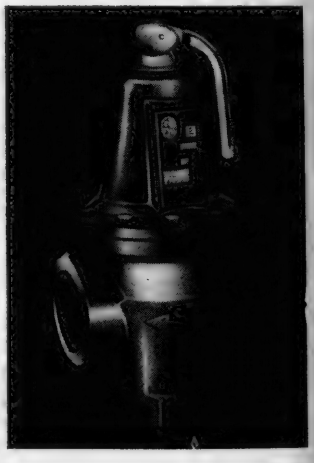


ANTI-SIPHON FEATURE ON ALL B&G REDUCING VALVES

An entirely new design principle prevents backflow of water when city water pressure drops below system pressure.

In normal operation, when valve seat **(1)** is forced down by spring **(2)** because of low system pressure, water flows in through the valve seat. To enter the system, water must first pass under the flexible sealing lips of the Anti-siphon Check Valve **(3)**.

In case of low city water pressure, the pressure on the inside of the Anti-siphon Check Valve (city water side) is less than the outside pressure (system water side). This outside pressure forces the lips of the Anti-siphon Check Valve against the main diaphragm **(4)** preventing backward flow of water from the system.



LARGER SIZES OF ASME RELIEF VALVES

The *plus value* features of B&G ASME Relief Valves are now available in 3,000,000 and 4,000,000 BTU units.

These valves are diaphragm operated. This construction transmits more power during opening and closing cycles, hence heavier, stronger springs can be used.

Diaphragm construction also establishes a new low differential of not to exceed *three pounds* between opening and closing pressures. B&G Relief Valves are *wide open* when the pressure is increased just a little above that required to open the valve. Resilient, heat resistant Silicone rubber valve seats assure no leakage when valve is closed.

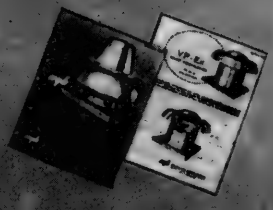
Send for descriptive literature on these three additions to the B&G line of Hydro-Flo Heating Products.

BELL & GOSSETT
COMPANY
Dept. ER-4, Morton Grove, Illinois
Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Drive, W. Toronto, Canada

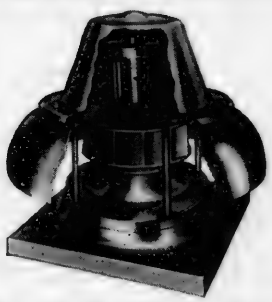
Introducing ...the Roof Ventilator "Twins"

... economical space-saving roof units to simplify your ventilating problems ...

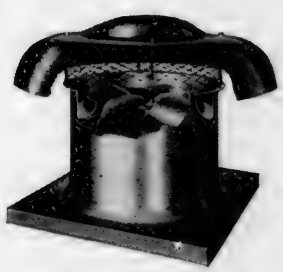
When roof ventilators provide the answer to your ventilating needs, select one of the nyb "Twins" for maximum dependability . . . and *economy*, too! The Bell-Ex will exhaust against high resistances effectively from hoods and duct work; the VP-Ex is a sturdy, flexible unit that may be used where resistances do not exceed ½ inch static pressure. The "Twins" are completely weatherproof and corrosion-resistant, easily accessible for maintenance . . . and of modern design to complement any exterior.



Write today for Bulletins 565 and 566 for further details on the Bell-Ex and VP-Ex "Twins"



BELL-EX (B-12) cutaway view showing fan assembly; motor is fully enclosed, continuous duty type, ball bearing.



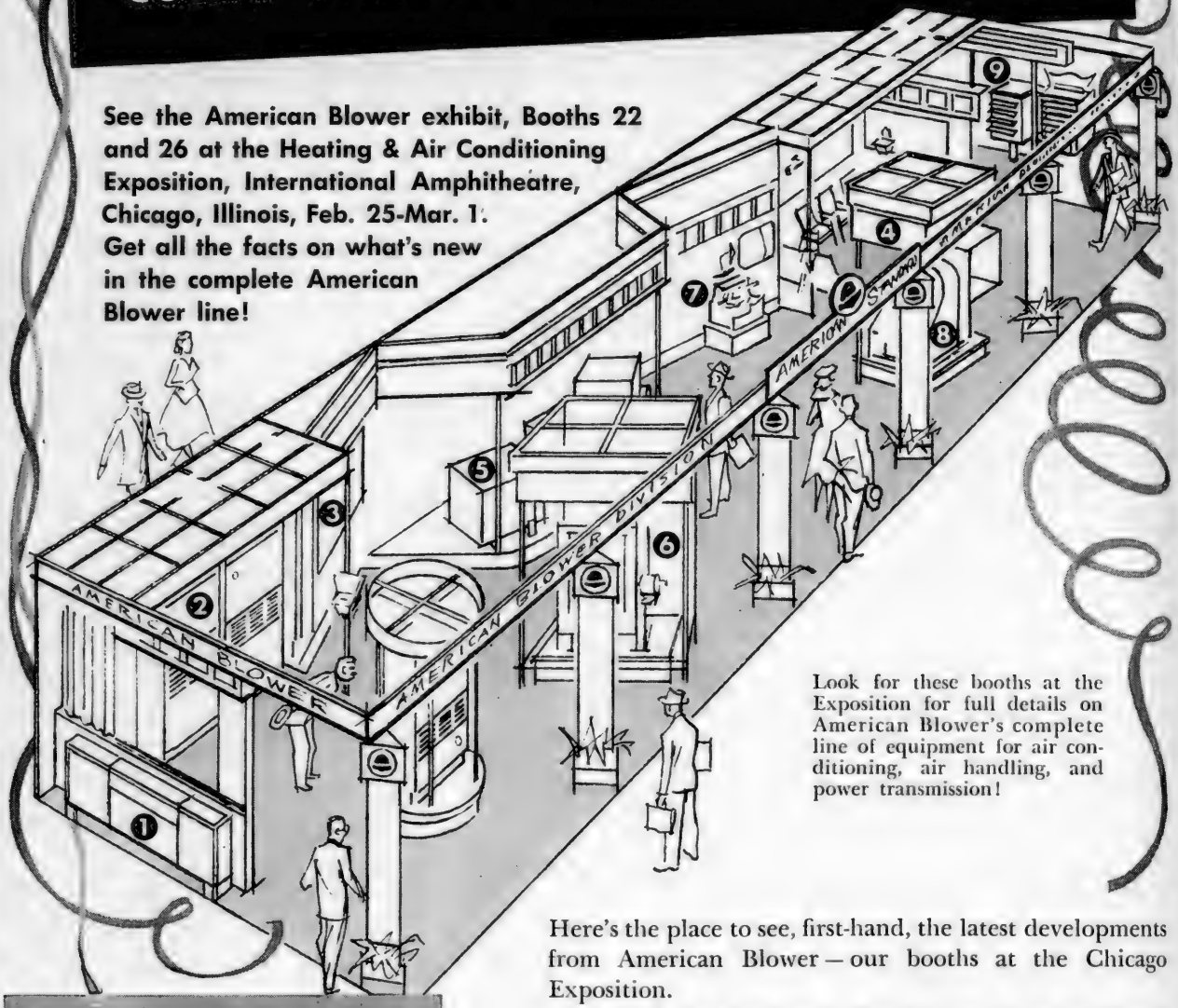
VP-EX cutaway view showing four-bladed fan, wire fan guard, spun inlet cone and bird screen.

nyb THE NEW YORK BLOWER COMPANY

SALES OFFICES: 3147 SOUTH SHIELDS AVENUE • CHICAGO 16

Come visit us at the Exposition!

See the American Blower exhibit, Booths 22 and 26 at the Heating & Air Conditioning Exposition, International Amphitheatre, Chicago, Illinois, Feb. 25-Mar. 1. Get all the facts on what's new in the complete American Blower line!



Look for these booths at the Exposition for full details on American Blower's complete line of equipment for air conditioning, air handling, and power transmission!

Here are some of the things you'll see!

1. **Unit Conditioners**—designed to provide year-round air conditioning on an individual-room basis.
2. **American Blower Packaged Air Conditioners**—modern styling, engineered for industrial and commercial applications.
3. **Tonrac*** centrifugal refrigeration machines that maintain chilled-water temperature regardless of load.
4. **Ventura Fans**—propeller fans, with streamlined inlets, for general ventilation in commercial applications.
5. **Air-Conditioning Units**—components for central station air-conditioning systems.
6. **Sirocco High-Pressure Fans**, for high-velocity direct air-conditioning systems and industrial applications.
7. **GYROL® Fluid Drives** for smooth power and adjustable-speed control in a wide variety of industrial applications.
8. **Utility Sets**—self-contained fan units for general supply or exhaust where duct work is required.
9. **Unit Heaters**—horizontal and vertical models for use with steam or hot water, plus gas-fired heaters.

*Trademark

Here's the place to see, first-hand, the latest developments from American Blower — our booths at the Chicago Exposition.

You'll find a display on Tonrac, our new centrifugal refrigeration machine that installs on a single level. You'll see our completely new line of comfort-engineered packaged air conditioners, the latest Gyrol Fluid Drive, high-pressure fan, utility set, unit heater, and much, much more.

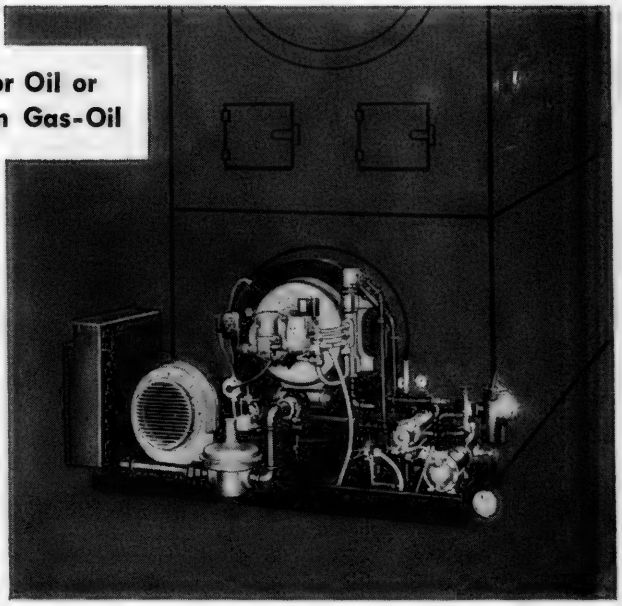
And there'll be motion pictures, moving displays, fact-filled literature — everything to make your visit interesting and informative. So make a note now to stop by! American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products.

AMERICAN BLOWER

Division of AMERICAN-Standard

How to use a Petro forced draft firing system

For Gas or Oil or combination Gas-Oil



1 Petro firing unit integrated with matched Scotch boiler as a complete boiler-burner unit

Here is a complete firing system available in a single unit. Installation consists of little more than securing the unit to the boiler and attaching fuel and power lines. No pitted boiler settings; no high stack. It is a thoroughly engineered unit, with all vital components matched and mounted on a single base. Includes burner (for gas, oil, or dual-fuel), factory mounted, refractory tile burner throat, secondary air volume control, motor driven forced draft fan and electrical control panel.

2 Petro firing unit can be applied to all types of boilers. Entire system factory built, wired and tested.

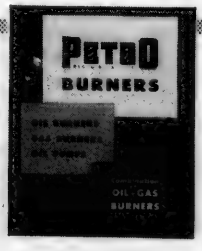
This is not a simple conversion burner—it is a complete firing system. Units are engineered to operate either under normal firebox draft conditions, or under positive pressure in sealed firebox boilers which are designed for operation under furnace pressure. A wide range of sizes is available for high or low pressure steam, or hot water for heating, processing and power requirements. Models are available for firing No. 6 or lighter fuel oils, and all types of fuel gas.

A Petro engineered system brings maximum dependability and operating efficiency

Savings in installation time, fuel, maintenance and operating costs are the result of Petro's half century record of thorough DEPENDABILITY. The most wanted features in a modern firing unit are contained in a Petro *complete* packaged forced draft burner system. Engineering service covers the nation.

Send for this PETRO® catalog

Over 50 years of leadership in automatic heating and power equipment



PETRO, 3521 W. 106th Street, Cleveland 11, Ohio.
In Canada, write to 2231 Bloor St., W., Toronto, Ontario.

Please send me literature and specification sheets on the money-saving Petro forced draft firing system.

Name_____
Company_____
Address_____
City_____ State_____

HOFFMAN TRAPS

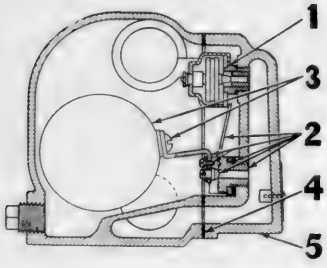
GUARD AGAINST STEAM WASTE

Hoffman Traps provide improved design to *function more effectively and economically in removing condensate* from steam lines and equipment.

Hoffman engineers have anticipated steam requirements that demand less maintenance time and operating costs. Typical of Hoffman's complete line are the Traps illustrated, each with removable cover, pin and seat for quick inspection and cleaning.

50 SERIES F & T TRAP

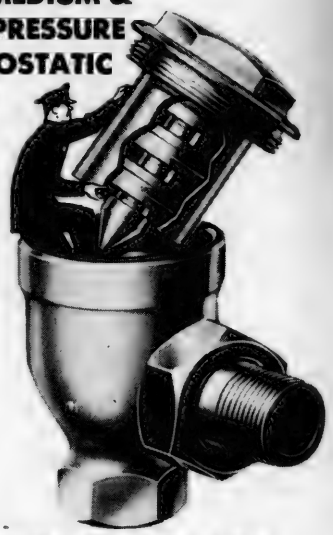
***Featuring* LOW MAINTENANCE COST**



Float and Thermostatic Traps are so designed that all working parts of the trap are a part of the removable cover. Once installed there is no necessity for the breaking of any pipe connection for cleaning and repairing.

1. Compact Thermostat Assembly
2. Durable, accurately machined Valve Lever and Seat Assembly
3. Copper Float Ball Assembly
4. Graphite Impregnated Asbestos Gasket
5. Heavy Duty Cast Iron Cover

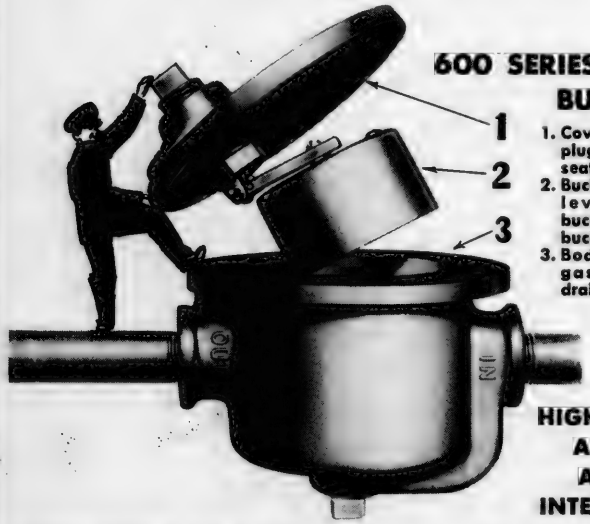
LOW, MEDIUM & HIGH PRESSURE THERMOSTATIC TRAPS



RENEWABLE THERMOSTATS and VALVE SEATS

A complete line of Low, Medium and High Pressure Thermostatic Traps for service with radiation, dryers, sterilizers, mangles, cookers and similar uses. Renewable thermostats and seats are important constructional features contributing to long life, low cost service. Medium and High Pressure Traps have stainless steel pins and renewable seats.

600 SERIES INVERTED BUCKET TRAP



1. Cover assembly with plug, valve seat, valve seat holder.
2. Bucket assembly with lever, valve stem, bucket pin, lock nut and bucket.
3. Body assembly with gasket and bottom drain plug.

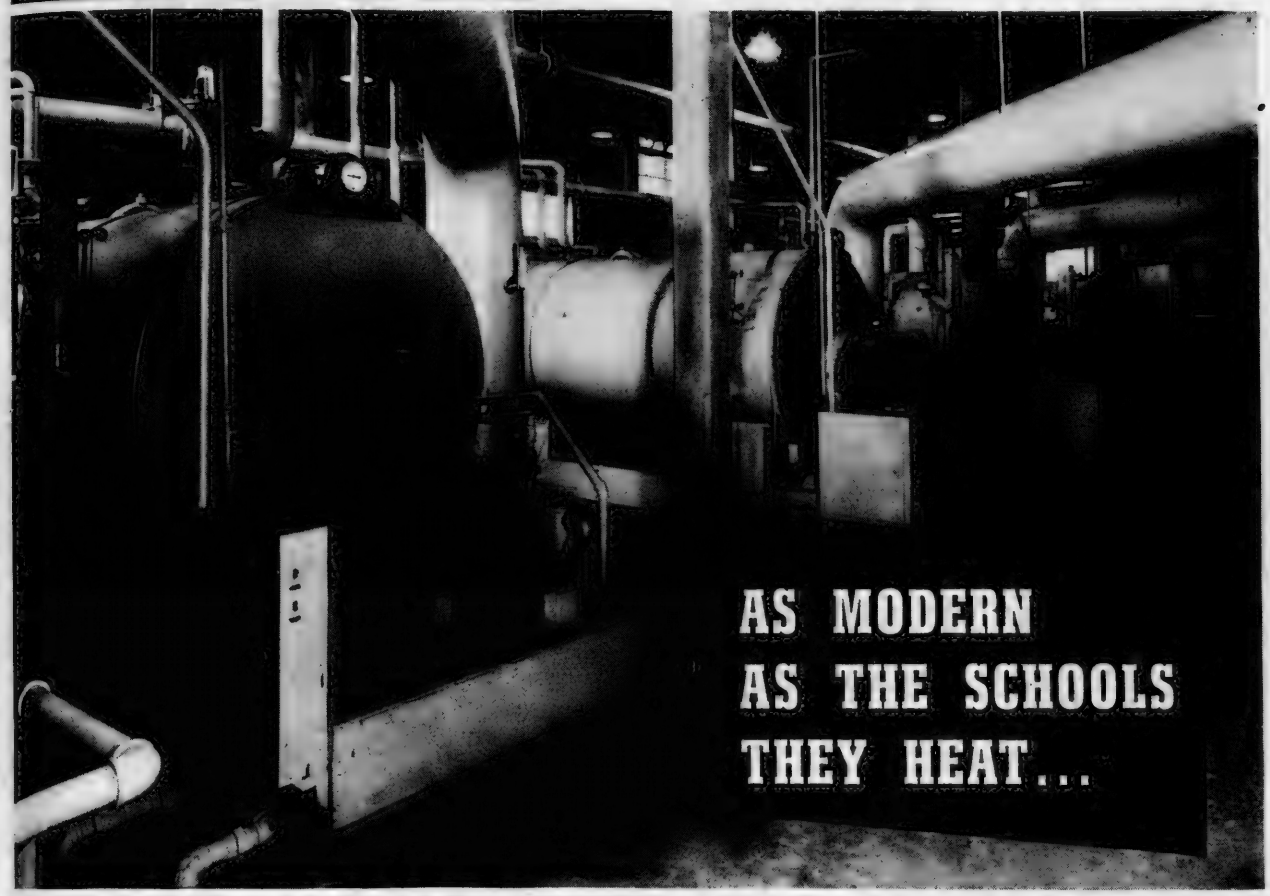
HIGHLY EFFICIENT AND EASILY ACCESSIBLE INTERIOR DESIGN

Hoffman Bucket Traps operate intermittently and are ideal for draining condensate and air from steam lines or equipment where large quantities of air and condensate must be discharged. They are easily inspected, cleaned and serviced by merely removing the cover assembly.

For full particulars, write for catalogs on Bucket Traps, Float and Thermostatic Traps or Thermostatic Traps

Armstrong High School, Richmond, Virginia
Carneal & Johnston, Archs. & Engrs. Richmond.

Four 125 hp. Superior Steam Generators for efficient, dependable heat and hot water.



...and best for industry too...

The excellence of modern school design is setting new standards for all types of industrial and institutional building . . . and it's no coincidence that hundreds of these highly efficient school buildings are equipped with Superior Steam Generators.

Superior Steam Generators offer the same functional design, the same ease of maintenance, the same years-ahead planning, and the same low operating and upkeep costs which make these school buildings outstanding.

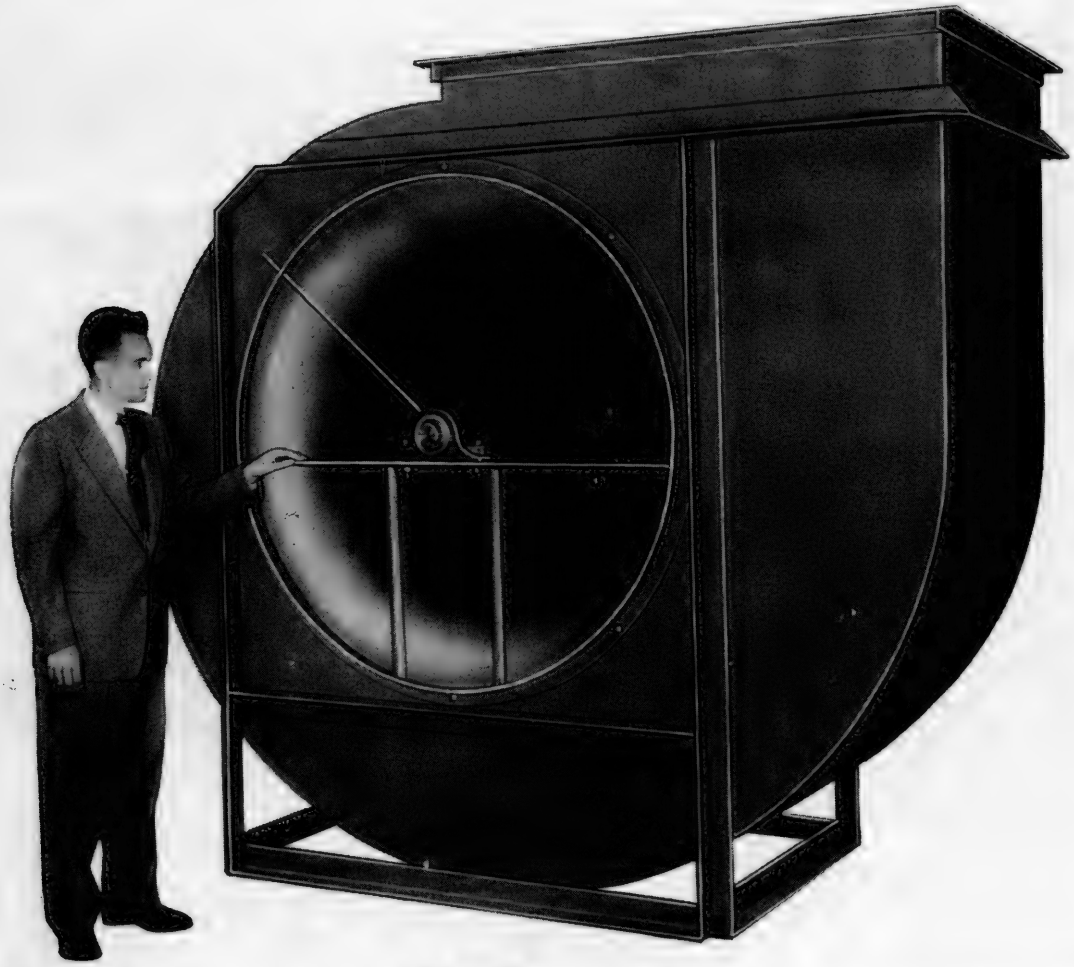
Complete packages, ready to go to work when delivered, Superior Steam Generators are factory fire-tested to insure peak performance, and backed by undivided responsibility. They require no expensive setting, no high stack; are equipped with an integrated induced draft system for cleaner, more quiet operation; and are fully automatic burning oil or gas.

Superior Steam Generators are built in 18 sizes, from 20 to 600 b.h.p., for pressures to 250 p.s.i., also for hot water. Write today for complete details in Catalog 819F.

for performance you can **BANK** *on*

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

SUPERIOR
STEAM GENERATORS



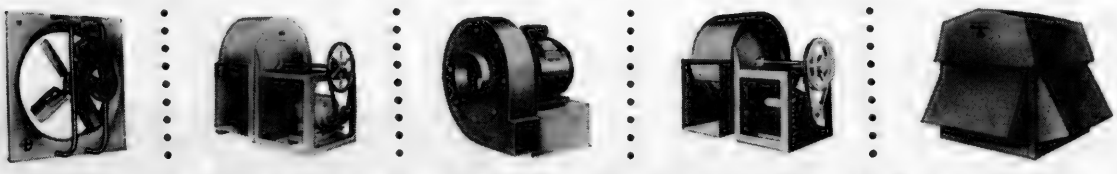
BIG BLOWERS ARE BIG BUSINESS WITH PEERLESS

QUIET! • TROUBLE-FREE! • DEPENDABLE! • HEAVY DUTY! • GUARANTEED!

Versatility in size, application, and engineering has always been a Peerless strong point. Peerless builds its own motors and matches them to the specified blower requirements. Peerless blower frames and housings are usually heavier than any competitive products. Result—a quiet, vibration-free unit.

These are not "off-the-shelf" units, but built to customer rotation and discharge specifications. Each one receives 100% inspection before it leaves the Peerless factory. Each unit is built to NAFM standards. Motors are built to NEMA standards. Each unit is ready for operation when received at the installation site.

A COMPLETE LINE OF AIR MOVING EQUIPMENT



Charter Member of the Air Moving and Conditioning Association, Inc. (AMCA)

Peerless Electric

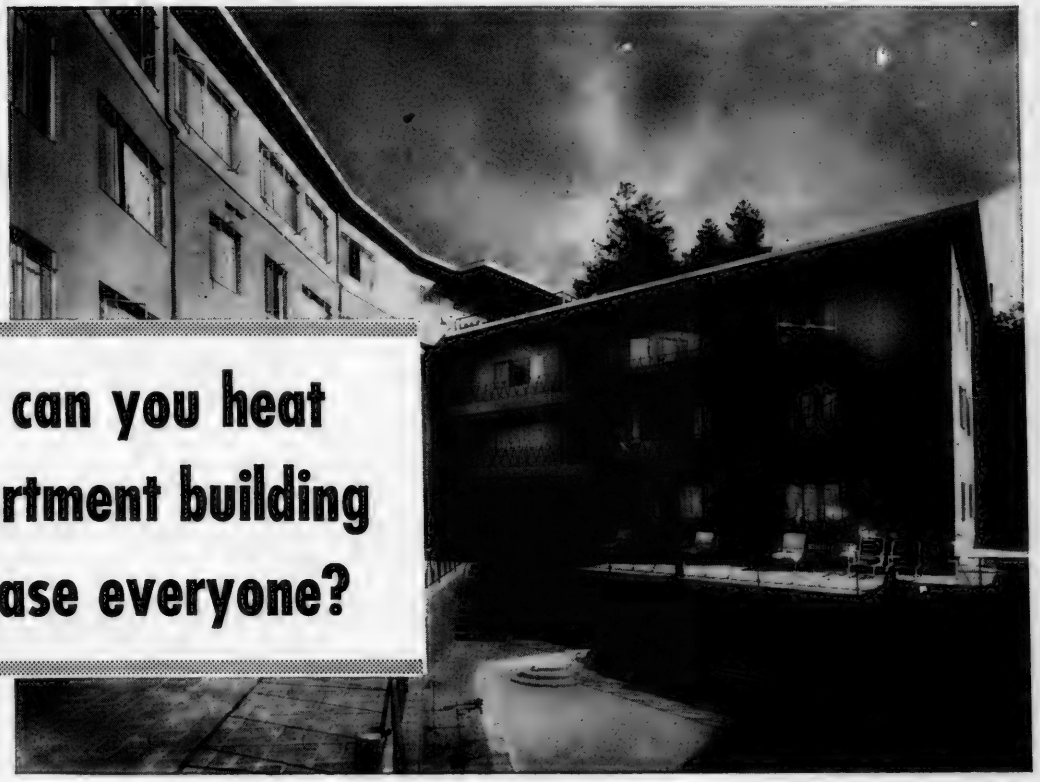
FAN AND BLOWER DIVISION

THE *Peerless-Electric*® COMPANY

1400 W. MARKET ST. • WARREN, OHIO

FANS • BLOWERS • ELECTRIC MOTORS • ELECTRONIC EQUIPMENT

Write Today for Bulletins SDA-220, SDA-200 and SDA-160.



How can you heat an apartment building to please everyone?

By letting each tenant select the temperature he likes in each room

IRON FIREMAN SelecTemp® HEATING

EVERY ROOM IS A SEPARATE HEATING ZONE with its own thermostat. Tenants can control the temperature according to their own preferences. The SelecTemp room heating unit automatically paces itself to supply just the right amount of heat needed. Unlike conventional "on-off" heating systems SelecTemp *modulates* from a slow "idling speed" up to full capacity. If one side of a building or home faces a cold wind while the other gets heat from the sun, the SelecTemp heating system automatically adjusts for this extra heat loss or gain *in each individual room.* In each SelecTemp unit the air is filtered, then heated by low pressure steam and circulated by a steam driven fan. There is no electric motor—both fans and thermostats are non-electric.

FOR ALL TYPES OF BUILDINGS AND HOMES Iron Fireman SelecTemp heating is ideal for any type of building or home, new or old. From the largest apartment, hotel, office or institutional building to the smallest residence, Iron Fireman SelecTemp system gives the same responsive and dependable service. It's a new, yet thoroughly proved method of heating that sets new standards of comfort and economy.

LOW INSTALLATION AND OPERATING COSTS. The installation of Iron Fireman SelecTemp in new or old construction is economical and practical. Installation costs are low. Overheating is eliminated and many owners report substantial savings in fuel bills.

FOR COOLING. Individual unit cooling with SelecTemp heating makes the perfect twosome for year 'round comfort.

Send for free literature. If you plan to build or modernize a building or a home, you owe it to your client and yourself to investigate Iron Fireman SelecTemp before deciding on any heating system. Don't miss the opportunity to learn about this great modern engineering advance in heating . . . Iron Fireman SelecTemp. Mail the coupon below.

SelecTemp room unit indicated by arrow.

Lee Street Apartments, Oakland, California.

"The installation presented an engineering problem," says Mr. Gordon Peterson, General Contractor, "as the boiler room is located at the extreme end of the building, a distance of 420 feet from the last SelecTemp unit. The system's flexible operation, its ability to heat only the occupied rooms, as well as its immediate response, is commended by our tenants. We feel that the SelecTemp heating system is the finest that has been devised for apartments" . . .

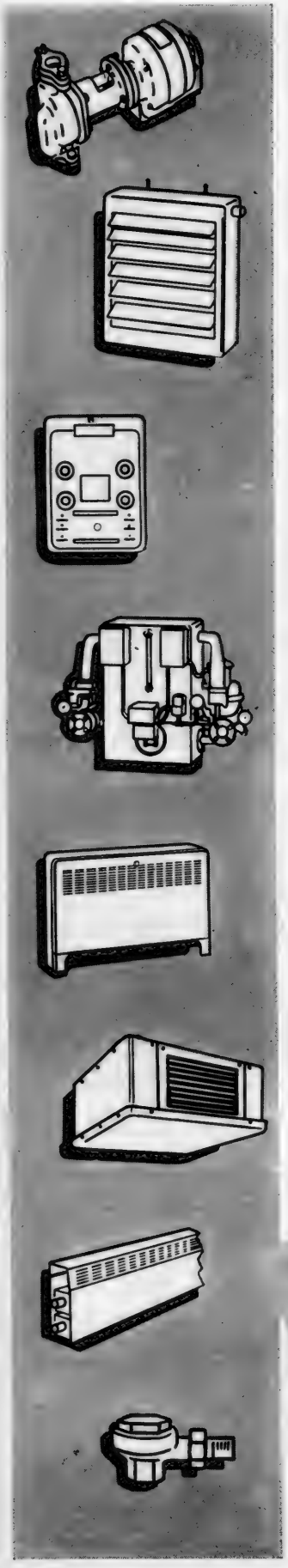
IRON FIREMAN®
Engineered
HEATING AND COOLING

MAIL COUPON FOR FREE INFORMATION

IRON FIREMAN MANUFACTURING CO.
3348 West 106th Street, Cleveland, Ohio.
(In Canada write to 80 Ward Street, Toronto)

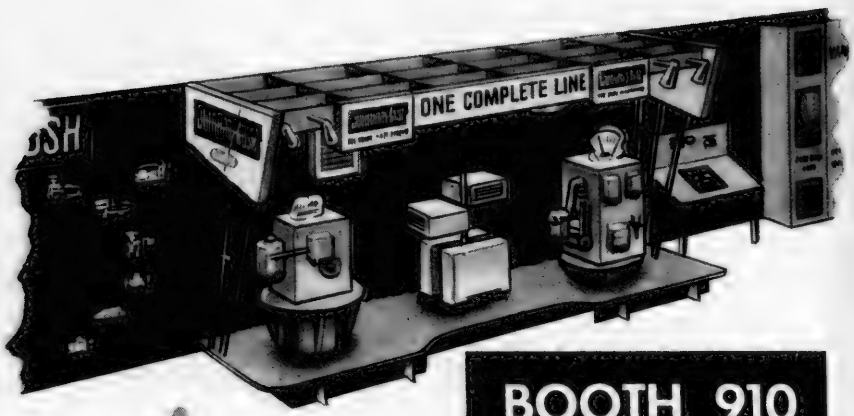
☐ Send SelecTemp specifications and full information.
☐ Arrange for brief demonstration of SelecTemp room unit, in actual operation, in our office.

Name_____
Firm_____
Address_____
City_____ Zone____ State_____



Save Time...

YOU'VE SEEN THE SHOW



BOOTH 910

DON'T MISS Dunham-Bush HEATING HEADQUARTERS AT BOOTH 910. Talk with America's top heating engineers. See the latest in Unit Heaters . . . Pumps . . . Vari-Vac Control Systems . . . Steam Specialties . . . Hot Water Specialties . . . Convectors . . . Baseboard Radiation . . . Finned Pipe Radiation . . . Vari-Air School Systems . . . Remote Type Heating-Cooling Units.

IT'S OUR FIRST SHOW AS

DUNHAM-BUSH

You've seen both of these famous concerns at previous Shows. Recent consolidation makes possible one complete air conditioning and heating line . . . "close-to-source" supply for faster delivery, lower freight rates . . . expanded engineering and research facilities. One Source . . . One Responsibility . . . Dunham-Bush!

Save Shoe Leather

WHEN YOU'VE SEEN THE

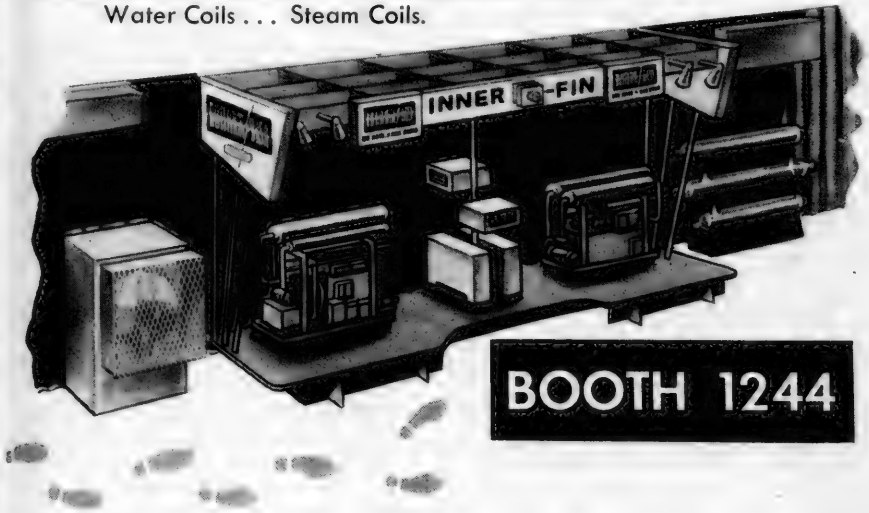
DUNHAM-BUSH

Complete Line

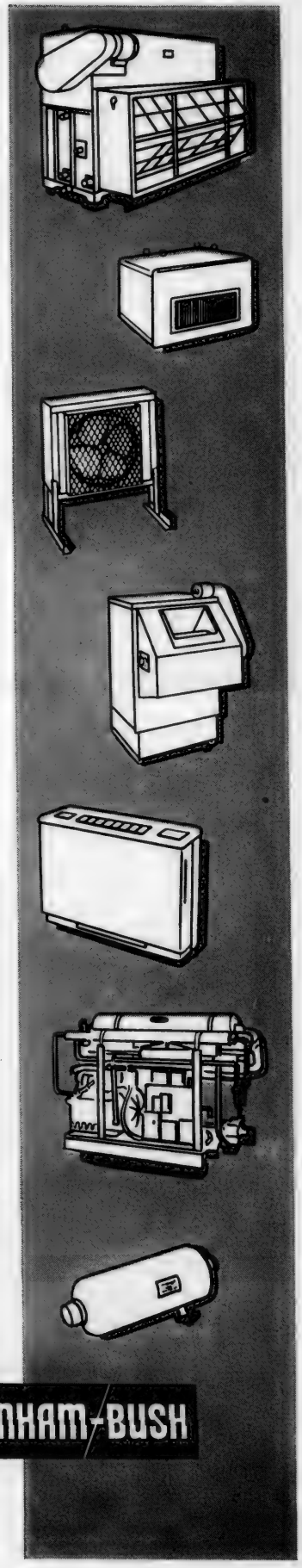
of AIR CONDITIONING AND HEATING PRODUCTS

It pays to deal with a single source—single responsibility! Whether you're "shopping" the show, or ordering air conditioning and heating equipment, you're time and money ahead with Dunham-Bush. Remember, Dunham-Bush offers you a *complete air conditioning and heating line.* "One Order Does It".

DON'T MISS Dunham-Bush AIR CONDITIONING HEADQUARTERS AT BOOTH 1244–48–50. Talk with America's top air conditioning engineers. See the latest in Air Handling Units . . . Multizone Units . . . Comfort Conditioners . . . Blower Condensers . . . Cooling Towers . . . Evaporative Condensers . . . Direct Expansion Coils . . . Water Coils . . . Steam Coils.



BOOTH 1244



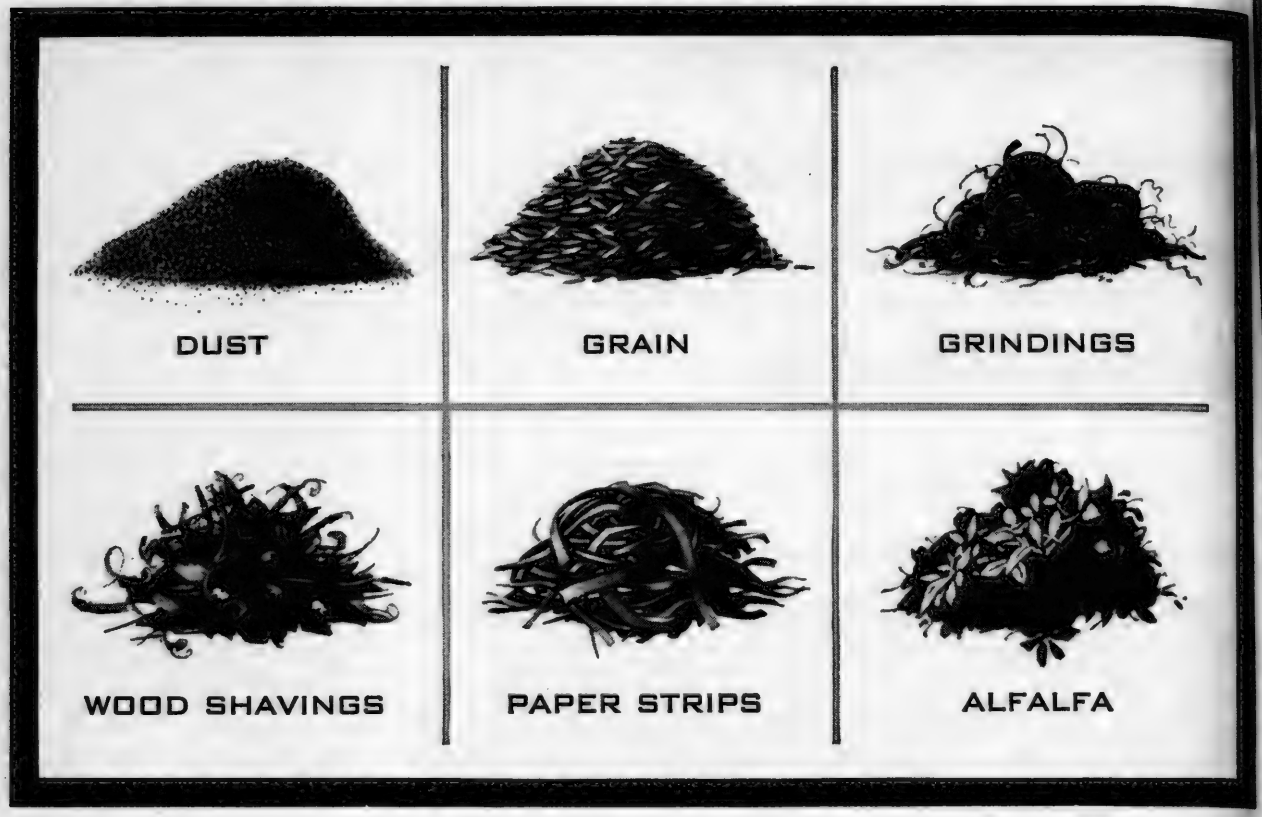
Dunham-Bush, Inc.

DUNHAM-BUSH

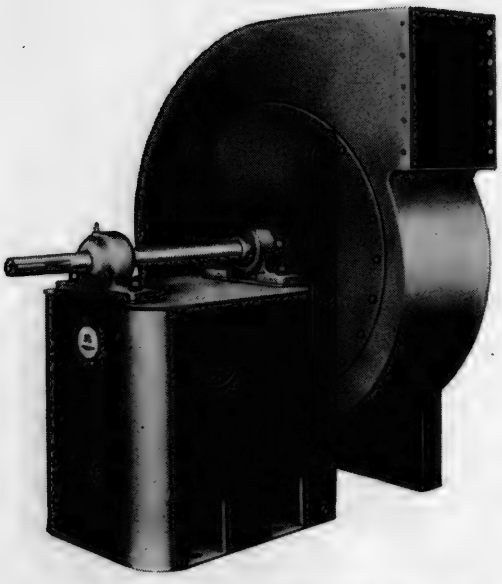
WEST HARTFORD 10 • CONNECTICUT • U. S. A.

Air Conditioning, Refrigeration, Heating Products and Accessories

MARSHALLTOWN, IOWA • MICHIGAN CITY, INDIANA • RIVERSIDE, CALIFORNIA
TORONTO, CANADA • LONDON, ENGLAND • SUBSIDIARY: HEAT-X, INC., BREWSTER, N. Y.



American Blower Industrial Fans take large or small particles right in stride!



Lick tough process applications with the versatile American Blower Industrial Fan.

The secret is their versatility. You see, the American Blower Industrial Fan is available with three types of wheels: Type AH for air handling, Type MH for material handling, Type LS for long shavings.

And there's a wide range of fan arrangements, optional constructions—for severe duties or high-temperature operation—and optional accessories to allow fan modification to suit an individual job.

What's more, it's available as a packaged fan—that is, a self-contained unit with its own motor, drive and weather-proof hood enclosure. This eliminates the need for a separate motor foundation, and the complications of motor lineup, belt centers and weather protection.

If you have a process application involving air, gas, or material handling, why not consider our industrial fan? Your nearest American Blower branch-office man is the one to call. His intimate knowledge of the special problems of many industries—and his complete product line—is at your disposal.

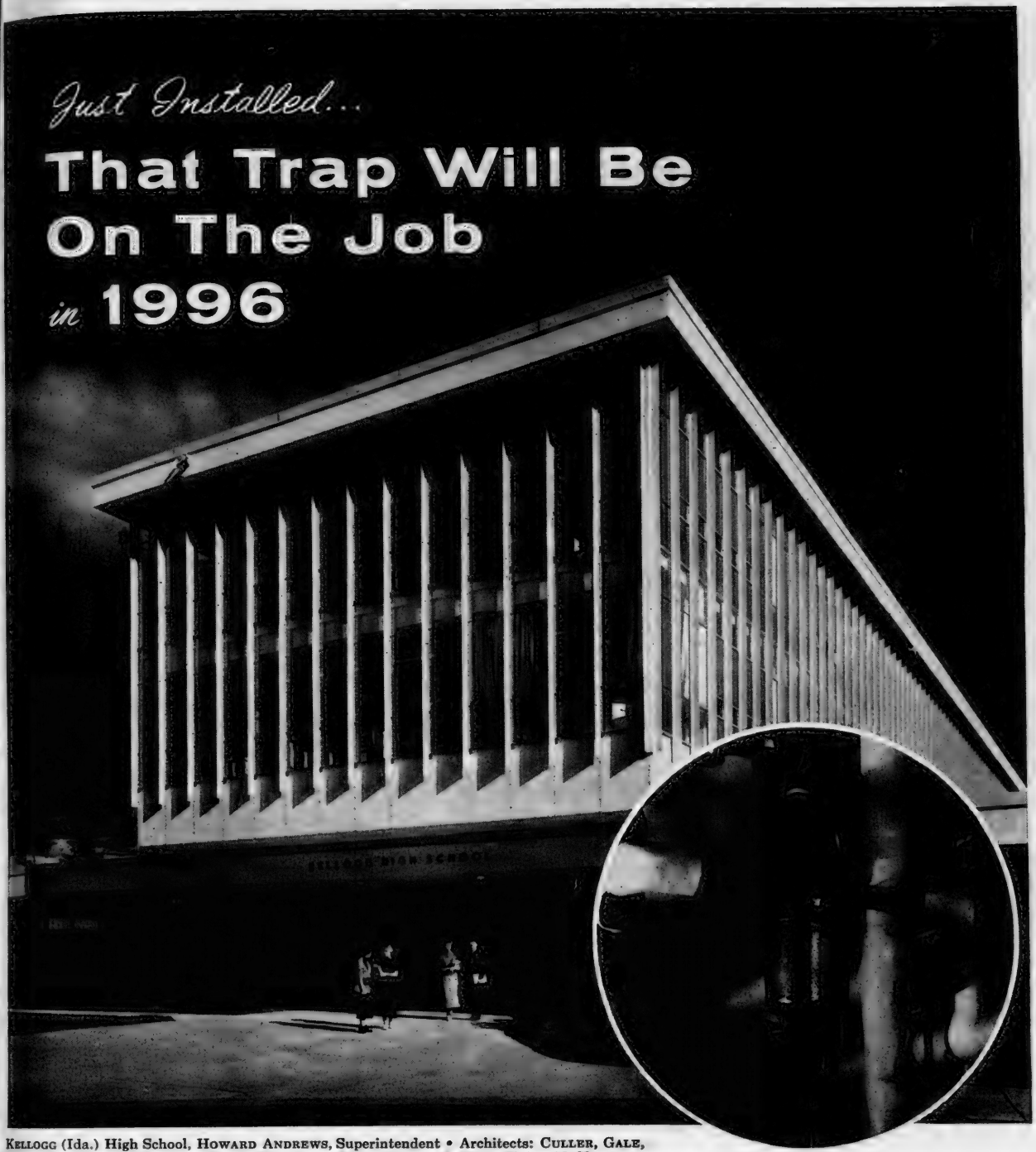
American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products.

AMERICAN BLOWER

Division of AMERICAN-Standard

Just Installed...

That Trap Will Be On The Job *in* 1996



KELLOGG (Ida.) High School, HOWARD ANDREWS, Superintendent • Architects: CULLER, GALE, MARTELL & NORRIE, Spokane, Wash., PERKINS & WILL, Chicago & White Plains, N. Y.
LYLE E. MARQUE & ASSOC., Mechanical Engineers

Brand new building, brand new Illinois heating specialty system . . . and they'll *both* be doing a smooth, efficient job 40 years from now, probably even longer.

The new high school at Kellogg, Idaho, was designed for the future—and so are its Illinois Engineering Float and Thermostatic traps (above), Strainers and Thermostatic traps. Kellogg High can count on more years of trouble-free service from Illinois than you'd ever expect from a steam trap . . . and there'll be few maintenance problems with Illinois traps' simple, solid design.

Specify a trap you can install and forget about for 40 years. Select from a full line of Thermostatic Traps, Float and Thermostatic Traps and Steam Traps. Traps range from 25 inches vacuum to 600 lbs. pressure in capacity. Write for Bulletin 110 now.

illinois ENGINEERING

Illinois Engineering Company

2015 S. Racine Ave., Chicago 8, Ill.

DIVISION OF AMERICAN AIR FILTER COMPANY, INC.

Heating Specialties • Power Specialties • Control Systems

There's MORE from Allis-Chalmers MOTOR distributors

Complete Motor Line

multi-speed

wound-rotor

face mounted

open

dc series wound

squirrel-cage

vertical solid shaft

totally enclosed

synchronous

vertical hollow shaft

drip-proof

foot mounted

splash-proof

"Synduction"

explosion-proof

dc compound wound

dc shunt wound

flange mounted

gear motors

. . . plus quality and service

As part of a national network of more than 200 franchised outlets, your nearby Allis-Chalmers Motor Distributor offers the rare combination of *fast service* and a *complete line* of *fine-performance* integral horsepower motors. He's the right man to give you just the right motor — in a hurry.

It adds up to:

1. Simplified Buying — Here's one source for all motors from 1 to 200 hp, as close as your telephone. Single source trims clerical costs, minimizes purchasing and accounting expenditures.

2. Reduced Inventory — You don't have to tie up funds and warehouse space with spare motors and replacement parts. The A-C Distributor is your motor storehouse.

3. Continuous Production — Your A-C Distributor can deliver a motor to your shop in a matter of hours. (And, once you order an A-C motor, you're sure of 'round-the-calendar operation.)

GET ACQUAINTED with your Allis-Chalmers Motor Distributor soon. You can find out his name by contacting the A-C sales office in your area, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

Synduction is an Allis-Chalmers trademark.

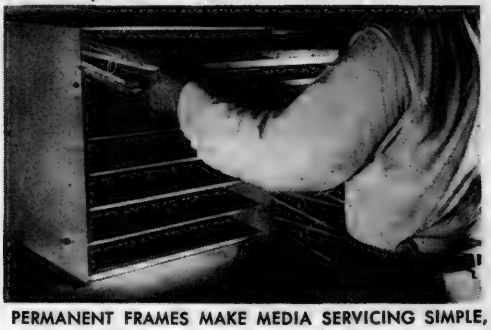
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5187

NEW MULTI-*Pak* AIR FILTER OFFERS YOU A MEDIA CHOICE, FOR THE EFFICIENCY YOU WANT!

MORE THAN 50 SQ. FT. OF MEDIA IN ONE UNIT. Renewable media is shown here being placed on one of the seven metal inserts that fit into the "pockets" of the MULTI-Pak unit. One 2′ x 2′ x 22¾″ unit contains more than 50 sq. ft. of media.



PERMANENT FRAMES MAKE MEDIA SERVICING SIMPLE, INEXPENSIVE. Here is a loaded insert being placed into a MULTI-Pak "pocket". The insert snaps into place behind retainer and forms a positive seal against air leakage. Permanent frames insure easy, inexpensive servicing.

A new high in filter versatility!

HERE'S the latest from AAF—multiple-media MULTI-Pak, the most *versatile* mechanical filter made. This new AAF product was specially designed to offer higher air cleaning efficiency, higher dust-holding capacity in a mechanical filter.

The dry-type MULTI-Pak takes a wide variety of renewable media materials, offers a wide range of efficiencies—all the way from plant pollen to tobacco smoke—even on extremely high-temperature jobs! There are more than 50 square feet of media in the seven "pockets" of one 2′ x 2′ x 22¾″ unit— *thirteen times* more media area than face area. Permanent media frames insure a perfect seal . . . make media servicing simple and inexpensive.

Get all the facts on this newest "first" from AAF. For complete MULTI-Pak information, call your nearest AAF representative or write direct for Bulletin No. 237.

AAF herman nelson

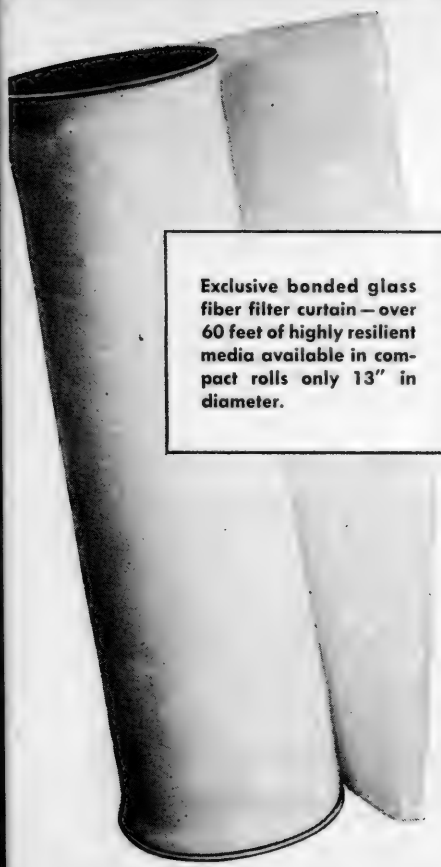
American Air Filter
COMPANY, INC.
294 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

VISIT AAF BOOTHS 38 and 40
International Heating and
Air Conditioning Exposition
February 25—March 1
International Amphitheatre, Chicago

Famous

AAF Roll-O-MATIC

Air Filter Principle



Exclusive bonded glass fiber filter curtain — over 60 feet of highly resilient media available in compact rolls only 13" in diameter.

- One roll of media ... lasts up to a year
- Loads like a camera
- Each roll of media can do job of a year's supply of disposable filters at ½ the cost
- Nothing to touch ... not even a button
- Automatically renewable media

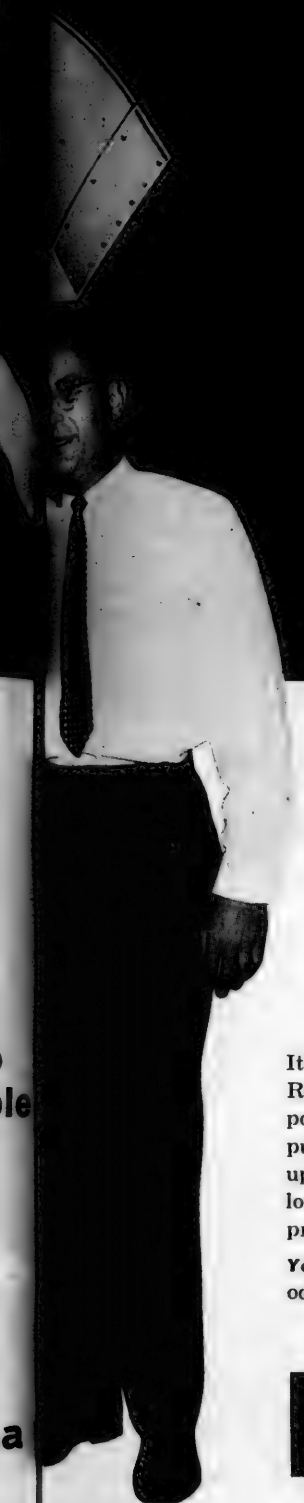
See the Roll-O-Vent at Booths 38, 40 at the ASH&AE Convention in Chicago.

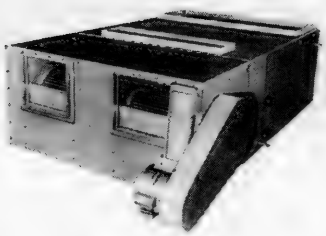
...Announcing

New Herman Nelson

Roll-O-Vent

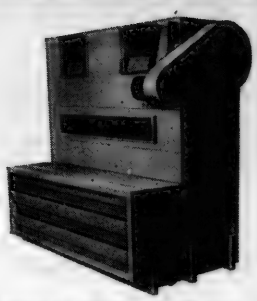
Heating, Ventilating and Cooling Units that change their own filters





HERMAN NELSON ROLL-O-VENT HEATING AND VENTILATING UNIT

HERMAN NELSON ROLL-O-VENT INDUSTRIAL UNIT HEATER



HERMAN NELSON ROLL-O-VENT AIR CONDITIONING UNIT

It's new. It's completely automatic. It's the exclusive Roll-O-Matic Filter now available on these three popular Roll-O-Vent air handling units. You simply put the roll of media in the unit—and forget it—for up to a year. It does *all* the work *automatically*. Just look at the better filtering and savings advantages provided only by new Roll-O-Vent units:

You save on the costly, time-consuming job of periodic filter changes.

You save by gaining maximum filtering efficiency *all year 'round* — because media is automatically changed at just the right time.

You save because ROLL-O-MATIC roll media *costs only half as much as* disposable filters.

Only Herman Nelson Roll-O-Vent "packaged" heating, ventilating and cooling units offer you Roll-O-Matic Filtering—exclusive development of American Air Filter Company. Write for new catalog.

Better Air Is Our Business

AAF herman nelson

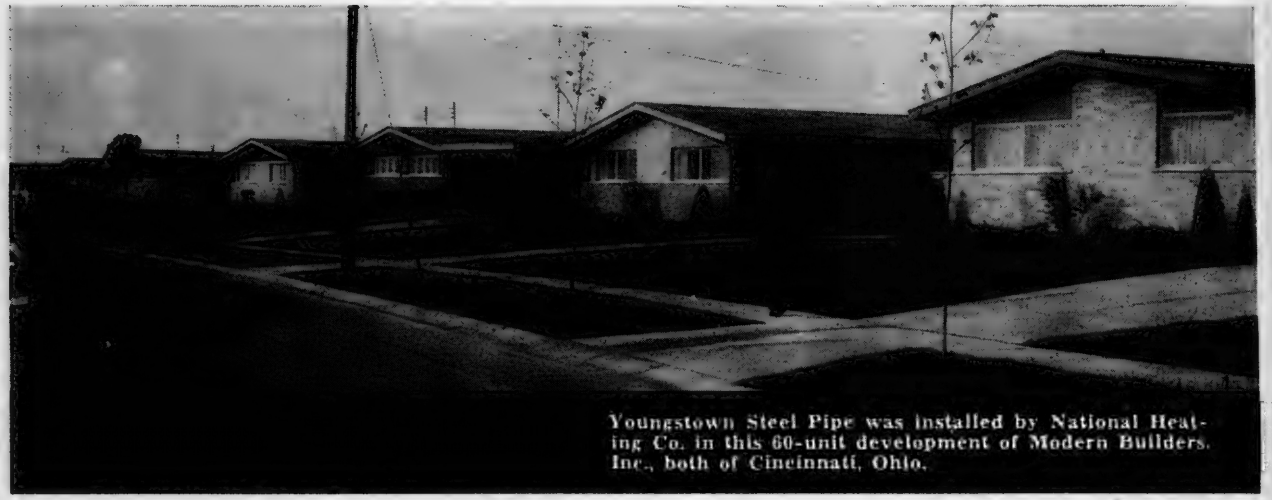
American Air Filter

COMPANY, INCORPORATED

294 Central Avenue • Louisville 8, Kentucky

Youngstown steel pipe

. . . Gives Long, Maintenance-Free Life to Radiant Heating Installations



Youngstown Steel Pipe was installed by National Heating Co. in this 60-unit development of Modern Builders, Inc., both of Cincinnati, Ohio.

Specify Youngstown and secure these 7 Points of uniform goodness

uniform ductility
uniform lengths
uniform threading
uniform weldability
uniform wall thickness and size
uniform strength and toughness
uniform roundness and straightness

Modern residential developments—like this 60-unit project off Cincinnati's Winton Road—demand only the most modern heating facilities. So, to afford these new homeowners warm, draft-free rooms of equalized temperatures, invisible radiant heating systems utilizing Youngstown Steel Pipe were installed.

For years Youngstown Steel Pipe has been specified by leading architects as well as progressive plumbing and heating contractors for its dependability and long life. That's because it's made of only the finest steel by steelmen with over half-a-century of steelmaking knowhow. All Youngstown operations from ore mining to finish threading are closely quality-controlled to give you the best piece of pipe obtainable anywhere. Why not make Youngstown your specification for long, trouble-free installations?

For additional information or service, contact your local Youngstown distributor—or phone our nearest District Sales Office, today.

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
General Offices - Youngstown 1, Ohio
District Sales Offices in Principal Cities

The PERFECT FOURSOME
for ALL *Air Conditioning Installations*

The SPORLAN CATCH-ALL Filter-Drier will protect the entire system from moisture...acid...sludge and foreign substances found in many systems.

SPORLAN SOLENOID VALVES...The power packed Blue Seal Coil minimizes the possibilities of electrical failures. The simplicity of design and sturdy construction afford Peak Performance always.

SPORLAN THERMOSTATIC EXPANSION VALVES for air conditioning... The famous Flow-Master element practically eliminates valve hunting and the worry of alternately flooded and starved evaporators.

SPORLAN

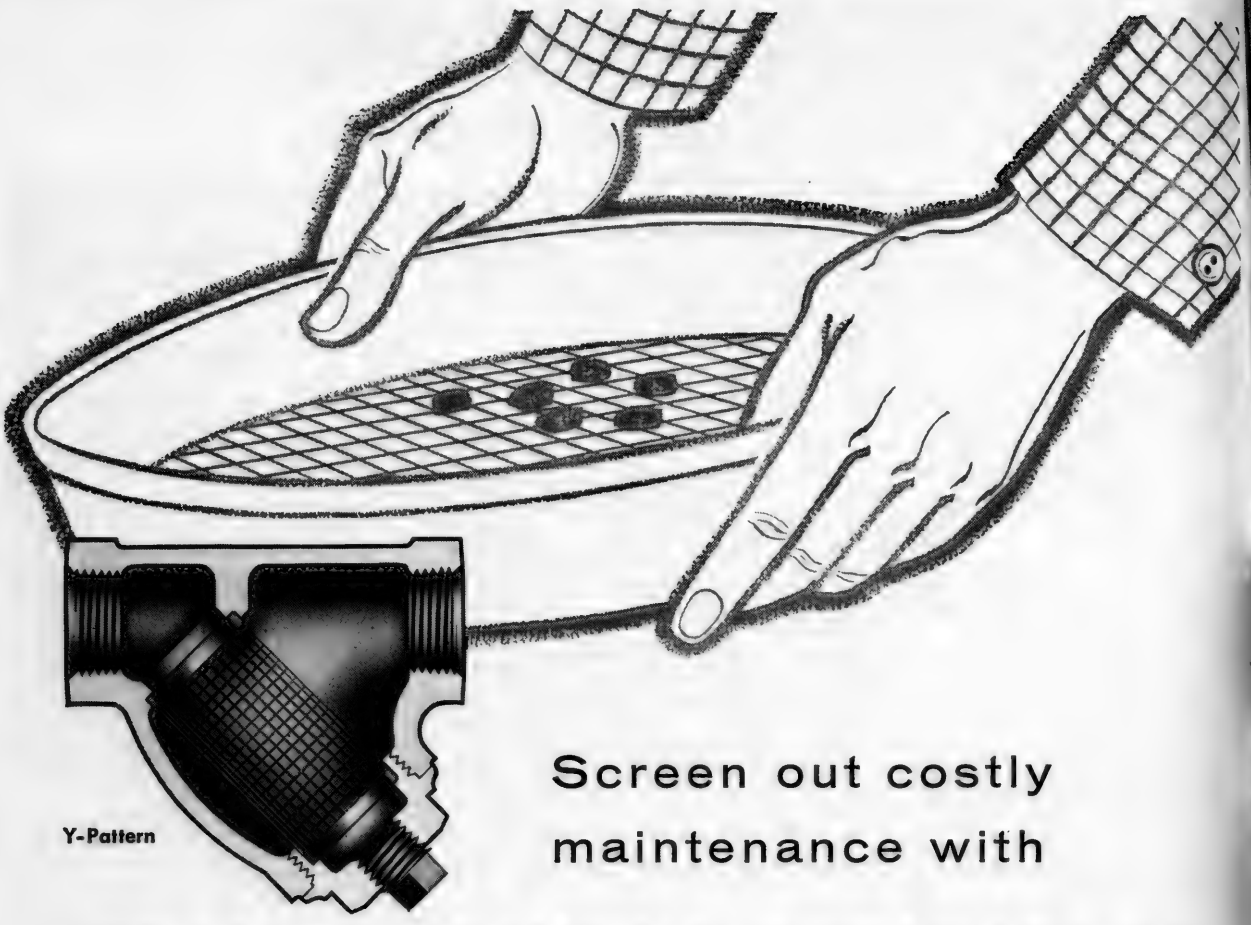
SPORLAN REFRIGERANT DISTRIBUTORS assure uniform distribution regardless of load...number of circuits...or evaporator temperature. The interchangeable nozzles give them flexibility and a wide range of applications. The perfectly designed conical button assures even distribution to all circuits.

See our exhibit **BOOTH 1254**
13TH INTERNATIONAL
HEATING AND AIR CONDITIONING EXPOSITION
International Amphitheatre, Chicago
FEBRUARY 25—MARCH 1, 1957

So with this combination...
the Sporlan Catch-All...Solenoid Valve...Thermostatic Expansion Valve and Refrigerant Distributor, you will get Peak Performance right down the line...

See your Sporlan Wholesaler TODAY

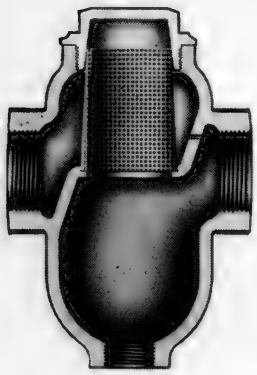
SPORLAN VALVE COMPANY
7525 SUSSEX AVENUE • ST. LOUIS 17, MISSOURI
EXPORT DEPT. • AD. AURIEMA, INC., 89 BROAD STREET, NEW YORK 4, N.Y.



Y-Pattern

Screen out costly maintenance with

CRANE SEDIMENT SEPARATORS



Vertical Types

Crane Sediment Separators positively and automatically trap foreign matter in fluid-handling lines—steam, water, air, oil or gas, high or low pressure—and hold it for easy removal.

Dirt, scale, sand and other injurious particles are prevented from damaging or spoiling product and ruining valve seats, automatic devices and other delicate equipment.

Because of their exceptionally large screening areas—more than 500% greater than pipe area—Crane Sediment Separators assure unrestricted flow of product, even when partially plugged. Note special blow-off connection for drain valve attachment which permits easy cleanout without interrupting flow service.

LITERATURE SENT ON REQUEST

Available in both Y-patterns and vertical types, with full range of capacities and sizes. For literature on Crane Sediment Separators, see your Crane Representative or write to address below.

CRANE VALVES & FITTINGS

PIPE • KITCHENS • PLUMBING • HEATING

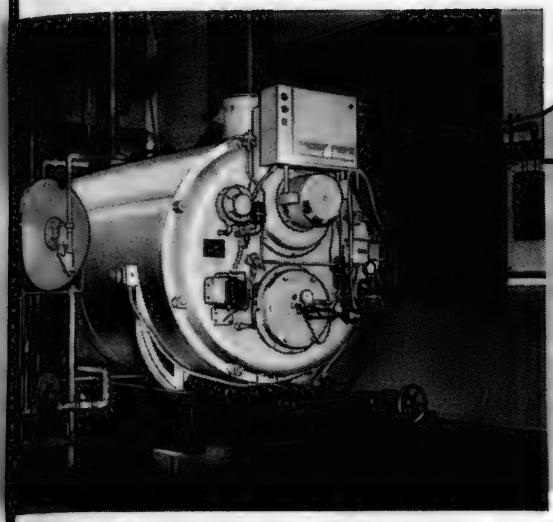
Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

One of America's largest and leading
dairy associations uses

69 CLEAVER-BROOKS BOILERS

SEE OUR EXHIBIT
BOOTH NOS. 648-650
INTERNATIONAL HEATING &
AIR CONDITIONING EXPOSITION
CHICAGO
FEB. 25 — MARCH 1

Location of Cleaver-Brooks boilers in League plants. Dairymen's League facilities include 70 country plants, 24 city branches, 6 ice cream plants and 9 manufacturing plants



MILTON, PA. — This country plant is supplied with quick, dry steam from a Cleaver-Brooks 60 hp light-oil fired CB boiler.

"Our 69 Cleaver-Brooks boilers are a key part of our production — their unusually high efficiency, sanitary, clean operation have helped us grow and prosper", says Ken Dodge, staff engineer for Dairymen's League Cooperative Association.

"Maintenance is low. We average far less than one service call per boiler per year," he adds.

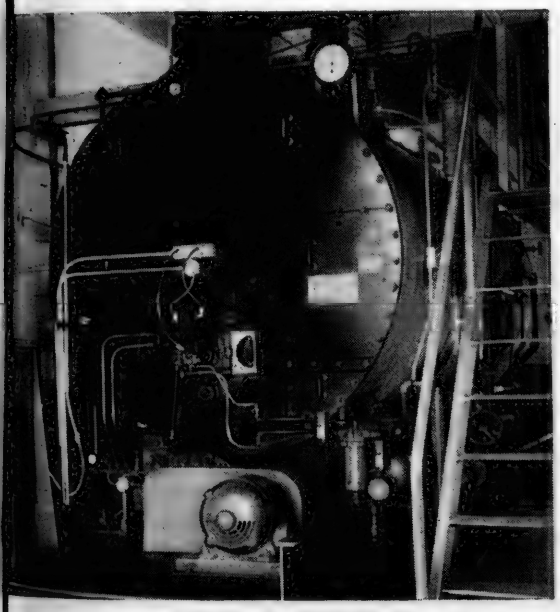
Dairymen's League Cooperative Association, serving 25,000 dairy farmers and thousands of consumers in New York, Pennsylvania and New Jersey, has been a steady user of Cleaver-Brooks boilers for 20 years.

Like any dairy company, the League finds steam essential for the production of quality dairy products. Their boilers are the work horses of their plants — supplying steam for pasteurizing, heating, cleaning and processing.

And Cleaver-Brooks boilers, with their exclusive four-pass, forced draft design and clean, quiet operation are especially suited to dairy plant operation.

Famous dairies the country over are profiting with the many advantages of Cleaver-Brooks boilers, available in a complete line. You can select from 110 models in 18 boiler sizes, 15 through 600 hp . . . oil, gas and combination oil and gas fired.

For more information contact your nearby Cleaver-Brooks representative. Or write Cleaver-Brooks Company, Dept. B 315 E. Keefe Avenue, Milwaukee 12, Wis. Cable Address: CLEBRO — Milwaukee — all codes.



UTICA, N.Y. — In this city plant a 250 hp LR heavy-oil fired boiler provides all steam for pasteurizing, cleaning, heating and processing.

Cleaver Brooks

ORIGINATORS OF THE SELF-CONTAINED BOILER

It's easy to give large rooms and entryways that Warm welcome

Type BF cabinet units, equipped with plenum bases and partially recessed in wall, maintain comfort in the hallways of this large midwestern elementary school.

Recessed in the counter, a Type BF keeps out cold air when door opens.

Using ducts, cabinet units heat adjacent rooms as well as auditorium.

the answer . . . Modine Cabinet Units

For that lasting "warm-welcome" first impression—in new buildings or remodeling jobs—there's nothing like Modine Cabinet Units for *performance, styling, versatility.* Five smartly-designed models—120 to 640 Edr—offer an unmatched variety of installation arrangements and mounting possibilities for quiet, efficient, economical heat distribution.

Some can be used for steam or hot water heating . . . others heat with hot water . . . cool with chilled water. They can be installed upright or inverted . . . fully exposed, recessed or concealed . . . on walls, floors or ceilings. All can be used with or without ducts. What's more, with inexpensive accessories, Modine Cabinet Units can be adapted to introduce, filter, heat and distribute fresh outside air for ventilation. Above all, they're economical—cost far less to install than individual unit ventilators or air conditioners.

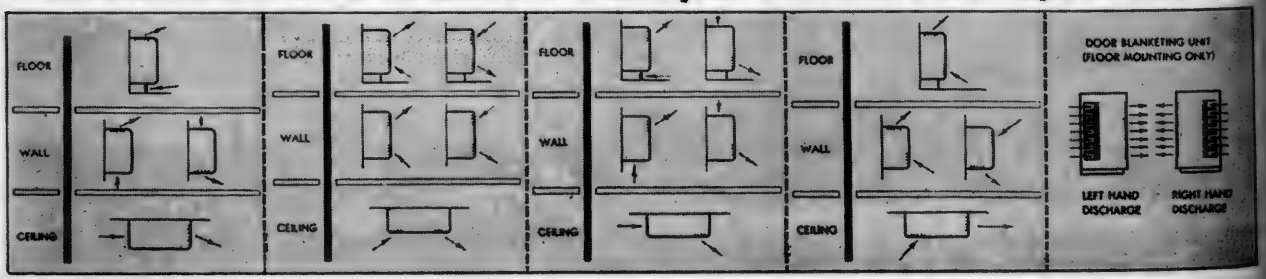
See the Modine representative listed in your classified phone book. Or write Modine Mfg. Co., 1511 DeKoven Ave., Racine, Wis., for Bulletin 552.

Modine CABINET UNITS

In Canada: Sarco, Ltd., Toronto

C-1315

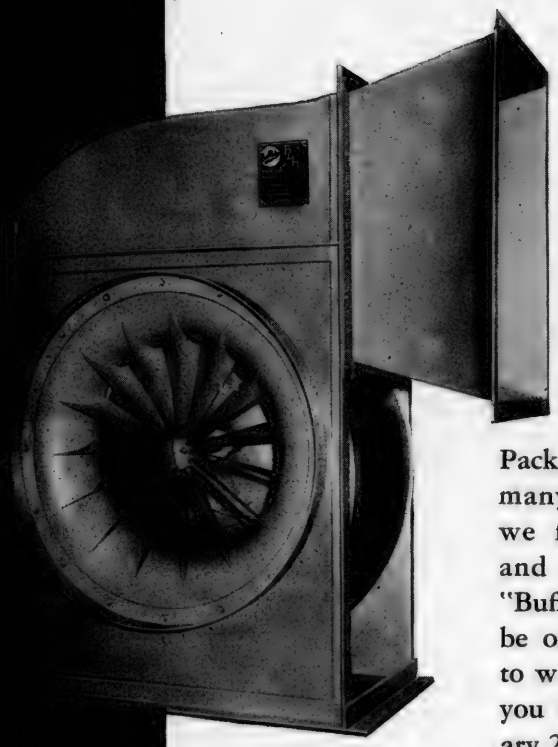
Choose from over 20 variations to match your individual room requirements



VISIT "BUFFALO" FOR THE AIR NEWS OF THE SHOW!

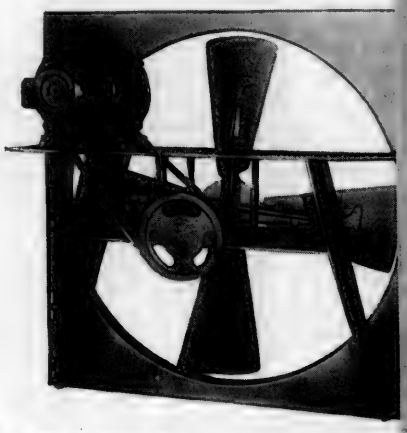
SPACE 937 • BUFFALO FORGE COMPANY

13th International Heating and Air Conditioning Exposition Feb. 25 to Mar. 1, 1957



A Class II, III & V fan series with cal efficiency.

The past year has seen the culmination of many extensive research projects in air handling at "Buffalo"—Package Roof Ventilators—new high efficiency centrifugal fans—widened applications for improved "Buffalo" Package Propeller Fans—many new developments we feel will be useful and interesting to you. "Buffalo" Engineers will be on hand at Space 937 to welcome you and show you what's new—February 25 to March 1.



NEW! Efficient packag propeller fans i sizes up to 120".

EW! Power roof ventilators in ready-to-

THIS NEW VACUUM HEATING PUMP IS SIZED TO ACTUAL JOB REQUIREMENTS

It's the Nash CSM

No longer is it necessary for the Engineer to accept a vacuum heating pump with air and water capacities based inflexibly upon square feet of equivalent direct radiation. With the flexible Nash CSM he can provide for proper air capacity in accordance with his judgment and experience. For the individual capacities of the separate pumps on the CSM may be varied within a wide range, without buying an oversize receiver and oversize water pumps.

These pumps possess many other features which permit a more efficient utilization of fuel and minimum use of electric power. Low, low, returns reduce installation costs and usually eliminate putting the pump in a pit. Simplicity and efficient operation reduce supervision and maintenance costs. Information regarding this new heating pump development is available immediately upon request.

- Increased air capacity induces rapid system response without wasteful overheating.
- Separate air and water pumps individually selected to meet actual job requirements.
- Control system that operates individual pumps only when needed.
- Flexibility permitting addition of radiation without changing basic pump installation.
- Low, low, return line connection.

NASH ENGINEERING COMPANY
438 WILSON, SO. NORWALK, CONN.

A Scientific Approach to Military Plumbing Fixture Requirements

H. GRAUS
Engineer Research and Development Laboratories
Fort Belvoir, Virginia

The accompanying data, originally determined for design application in military installations, are presented also as an indication of minimum space requirements for water closets, urinals, lavatories and shower facilities.

WHERE there is no critical need to conserve space, the problem of adjusting architectural design to body form in planning sanitary and ablution facilities is frequently solved in a very approximate manner. Fixture loading, too, is often determined by loose estimates.

Military needs, however, require close attention to space design with respect to human body dimensions, and to fixture loading as the determining factors in specifying the minimum adequate equipment for given personnel numbers. Both are important in determining efficient space utilization, low transport weight, in particular for air cargoes, and economy in materials.

The Corps of Engineers' Research and Development Laboratories at Fort Belvoir, Virginia, are currently engaged in designing sanitary facilities on the basis of bodily dimensional statistics descriptive of the average army population. These data were compiled by the John B. Pierce Foundation, under contract with the Laboratories, from a survey of data available from military reports. Although a number of references to the anthropometry of civilian populations are available, most have been prepared for special groups, with no guarantees that the values are representative of selected military populations. Time studies of human toilet and ablution, as well as mess operations have been conducted by the Laboratories to determine the minimum number of fixtures required.

The dimensions used by the Laboratories as a guide in close planning of military facilities under conditions of restricted space allotments have been tabulated in Table 1.

Employing the applicable figures from this table, mean and 99%, the Prefabricated Buildings Branch of the Engineer Laboratories has determined minimum adequate physiological space requirements for water closets, lavoratories, shower facilities and urinals.

TABLE 1. BODY DIMENSIONS OF MALE MILITARY PERSONNEL USED IN DETERMINING MINIMUM SPACE FOR SANITARY FACILITIES

(See sketches for graphical definitions of terms)

Measurement	Mean Inches	Range, Inches, for (± 2 SD)[a] 95%	Range, Inches, for (± 3 SD)[a] 99%
Bi-deltoid (F)	17.938	15.99- 19.89	15.01- 20.86
Hip Breadth (A) ..	13.954	12.27- 15.64	11.42- 16.49
Sitting Height (G) .	35.771	33.10- 38.44	31.76- 39.78
Stature (D)	68.432	63.46- 73.41	60.97- 75.89
Buttock-Knee (B) ..	23.393	21.14- 25.65	20.01- 26.78
Patella Height (C) .	21.624	19.46- 23.79	18.28- 24.87
Shoulder-Elbow (H)	14.300	12.87- 15.73	12.15- 16.45
Weight (pounds) ..	154.757	113.77-195.74	93.28-216.24
	Median, Inches	Range, Inches	
Space(I)	71.5	62.2 - 80.7[b]	
Anterior Arm Reach (J)	35.2	29.5 - 40.6[b]	

[a] SD = Standard Deviation.
[b] Standard deviations are not available for these two items, but the range limits may be taken as approximately equal to ±3 standard deviations above and below the reported median value.

In conventional practice employing a closed door compartment, 51 inches back to front door surface and 32 inches wall to wall are considered to be satisfactory water closet measurements. These permit clothing adjustments, changes of posture and appropriate clearance of accessories such as wall-mounted paper boxes. The floor space required for units of this general character is affected by the use of structural partitions and a swinging compartment door. In military use such closures are not deemed necessary for men.

On the planning platform used in this space study, panels and typical features were set up to correspond to conventional practice. Empirical reductions were made in these dimensions in order for staff members to study the character of movement restrictions or other objections which appeared as dimensions were reduced.

In the absence of the solid compartment door, the most frequent restriction experienced concerned the extended position of the elbows when the arms were held in the akimbo position. On a male population of 3,000 the mean value for the fully extended akimbo position is reported to be 37.1 inches, with an extreme value of 42.5 inches. This measurement was not applied at its 100% value since it is not usual for both arms to be extended with bent elbows on a plane approximately shoulder height. Seventy per cent of the maximum male akimbo position (a value of 29.75 in) may be accommodated by bowl spacing, center to center, of 30 inches.

In revising civilian standard water closets, dimensions for hip breadth, buttock-knee length, patella height, and stature shown in Table 1 were considered, together with the movement are indicated. The following space allotments were checked and justified: rear wall to water closet seat front, 24 inches; rear wall to forward toe position in seated posture, 38 inches; momentary aisle projection during clothing adjustment, 38 inches plus 6 inches.

This gives a unit water closet physiological area of 7.92 square feet, a reduction of 4.76 square feet per unit over the conventional civil allowance. The reduction provides adequate water closet operation of 163 uncompartmented or curtained units on floor space normally assigned to 100 units in civil practice.

Commercially available lavatories suitable for in-line wall mounting range in size from approximately 24 inches wide by 20 inches deep to 14 inches wide by 13 inches deep. The first figure gives wall contact, the latter the depth of fixture. Civil practice commonly recommends a fixture dimension near 18 inches wide by 17 inches deep.

For in-line installations, the body dimensions considered were bi-deltoid shoulder width, arm-akimbo span, again taken as a 70% value (29.75 inches) and sitting height. The last measurement gives the reach of the body from buttocks to head in the horizontal planes when the body is bent at the waist. It is taken at 70% of the extreme value or 28.4 to correspond with a waist angle varying from vertical to 45 degrees, approximately, during washing.

Forward trunk position with respect to the lavatory unit, and washing operations involving a semi-extended arms-akimbo span, are met adequately by a 30-inch center-to-center lavatory spacing. Physiological space for operation is met adequately by an area 32 inches in depth from the wall, accommodating a bent posture of 28.4 in leeway for fixture clearance. An additional 6 inches is specified in the plans as marginal physiological area. This gives a recommended physiological area 30 inches wide and 38 inches deep.

This area is adequate with the wall mounted fixtures 14 inches deep. These represent a practical minimum in this type of lavatory fixture. Depths up to 20 inches are common in commercially standard items. On this

TABLE 2. WATER CLOSET REQUIREMENTS FOR MALE PERSONNEL

Number of Personnel	Simultaneous Return Method		Consecutive Return Method	
	Calculated Requirement	Practical Requirement	Calculated Requirement	Practical Requirement
	Number of Closets			
1	.05	1	.05	1
5	.23	1	.23	1
10	.46	2	.46	2
20	.94	2	.93	2
40	1.94	2	1.88	2
60	2.99	3	2.86	3
80	4.11	4	3.87	4
100	5.30	6	4.91	5
120	6.57	7	5.99	6
140	7.92	8	7.09	7
160	9.37	10	8.23	9
180	10.92	11	9.40	10
200	12.60	13	10.61	11
250*	13.80	14	12.51	13
300*	17.27	18	15.31	16
400*	25.19	26	21.22	22
500**	29.66	30	25.84	26

* It was assumed that in order to keep the serving time at a minimum, the serving line would be limited to 200 men. Time data for personnel of 250, 300 and 400 men were therefore based on two lines of equal number for each group.
** Based on three serving lines.

basis, the minimum recommended area reduces space requirement by 180 square inches per unit, equivalent to a gain of the space area requirement of one unit for each 5.3 installations on the minimum adequate plan.

In the design of single shower stalls, figures for stature height and bi-deltoid shoulder measurement shown in Table 1 and the arm-akimbo span with a mean at 37.4 inches and 42.5 inches extreme range indicated that the 30 inch x 30 inch x 76 inch minimum standard commercial dimensions were justified for military populations. Military use of the 30 inch x 30 inch minimum base dimension, with the diagonal of the base providing a line equivalent to the akimbo span, provides physiologically adequate shower operation and permits a reduction of 5.75 square feet per shower unit from the civil allowance of 12 square feet. This provides 19 shower installations on floor space allotted to 10 in civil practice.

Short function time and static posture during urination simplify the adequate space requirement specifications of urinals. Lineal spacing 10% in excess of 99% military population extreme on the bi-deltoid (shoulder) measurement of 20.9 inches results in a minimum adequate wall spacing of 22 inches for individual fixtures. Standard fixture widths are easily accommodated within this spacing. Fixture depths of the order of 12 inches, plus body widths are conveniently accommodated by a physiological area 30 inches in depth in front of the fixture.

Where trough installations are used, individual fixture position does not center the user in such a manner as to require spacing based on extreme shoulder measurements. Trough installations require a minimum spacing base on mean shoulder measurement of 17.9 inches. Recommended spacing with 10 per cent lineal allowance included, as for individual fixtures, is 19.8 inches per man.

The principal gain in efficiency is in the use of trough fixtures where units of five or more are indicated. Where an individual installation will accommodate 10 uses at one time, trough facilities of the same wall length will accommodate 11.

In addition to space determination, time studies of human toilet and ablution were conducted to determine fixture loading and minimum fixture requirements. Revision of existing approximate standards is necessitated by the fact that weight and space consideration in transportation demand close attention to exact specifications of the minimum adequate equipment for given personnel numbers.

TABLE 3. URINAL REQUIREMENTS FOR MALE PERSONNEL

Number of Personnel	Calculated Requirements	Practical Requirements
	Number of Urinals	
1	—	—
5	0.13	1
10	0.25	1
20	0.50	1
40	1.0	1
60	1.5	2
80	2.0	2
100	2.5	3
120	3.0	3
140	3.5	4
160	4.0	4
180	4.5	5
200	5.0	5
250	6.3	7
300	7.5	8
400	10.0	10
500	12.5	13

TABLE 4. LAVATORY REQUIREMENTS FOR MALE OR FEMALE PERSONNEL

Number of Personnel	Calculated Requirements	Practical Requirements
	Number of Lavatories	
1	0.13	1
5	0.67	1
10	1.33	2
20	2.67	3
40	5.34	6
60	8.00	8
80	10.68	11
100	13.35	14
120	16.00	16
140	18.69	19
160	21.36	22
180	24.00	24
200	26.70	27
250	33.38	34
300	40.00	40
400	53.33	54
500	66.67	67

Conducting the time studies, the Laboratories' Prefabricated Buildings Branch made use of a full scale wooden mock-up of a facility designed for sanitary service for a 22-man barracks. While results of general significance were desired, it was felt that the fixture arrangements and personnel movements within a floor space of 8 feet x 16 feet serving a group of 22 would provide a serviceable testing ground for this problem. This mock-up was also used to test the dimensional adequacy of fixtures and fixture spacing already covered.

Motions involved in the standard operations of personal sanitation under group conditions were tested in this area, and time records secured of the actual operations using the connected sanitary facilities of the Laboratories.

From inspection of these time routines it was apparent that optimum loading of facilities for groups of various sizes could only be determined through a study of peak load conditions. On military schedules this condition occurs in the morning in 120 minutes allotted for mess service, quarters policing, and personal sanitation, with the heaviest water closet peak occurring in the 60 minutes after breakfast. Studies indicated that if an overlap of as much as 15 minutes occurred between first in and last out at meal service, load on sanitary facilities would be relieved by an equal amount.

Since it seemed unrealistic to make exact measurements of toilet and washing operations and to estimate eating schedules, a practical measurement was made of mess operation. This information was used in conjunction with the time studies from sanitary operations to compute optimum fixture loading for personnel numbers varying from 1 to 500.

Calculation of the water closet requirements was based on the following assumptions:

TABLE 5. SHOWER REQUIREMENTS FOR MALE PERSONNEL IN VARIOUS CLIMATES

Number of Personnel	Tropical Climate		Temperate Climate		Arctic Climate	
	Calculated Requirements	Practical Requirements	Calculated Requirements	Practical Requirements	Calculated Requirements	Practical Requirements
	Number of Showers					
1	0.05	1	0.04	1	0.03	1
5	0.27	1	0.20	1	0.14	1
10	0.54	1	0.41	1	0.27	1
20	1.08	1	0.81	1	0.54	1
40	2.16	2	1.62	2	1.08	2
60	3.24	4	2.42	3	1.62	2
80	4.32	5	3.23	4	2.16	3
100	5.41	6	4.06	4	2.70	3
120	6.49	7	4.84	5	3.24	4
140	7.57	8	5.65	6	3.78	4
160	8.65	9	6.45	7	4.32	5
180	9.73	10	7.26	8	4.86	5
200	10.81	11	8.11	8	5.41	6
250	13.51	14	10.13	10	6.76	7
300	16.22	16	12.17	12	8.11	8
400	21.62	22	16.22	16	10.81	11
500	27.03	27	20.27	20	13.51	14

1. Military time schedule:
   0600—arise
   0630—leave for breakfast
   0700—start leaving mess
   0800—complete quarters policing and personal sanitation
2. Peak Load:
   After breakfast to 0800.
3. 100% use factor, i.e., all personnel will use water closets during peak period.
4. Serving times in mess line: 63 seconds per man
   Rate: 4.85 seconds per man
5. Average defecation time: 162 seconds
6. Normal distribution of eating time.
7. Normal distribution of peristaltic impulse

In Table 2 water closet requirements data on facility loading resulting from both the simultaneous and consecutive return of personnel from mess are compared to illustrate the fixture savings possible by use of the consecutive return method.

In computation of data for urinal requirements, average urination time was assumed to be 45 seconds with a peak load of 30 minutes from 6:00 to 6:30 a.m. See Table 3.

Assumptions employed in computation of data for lavatory requirements (Table 4) were: (1) Peak load: 6:00 to 6:30 a.m.; (2) During this interval, 25% of personnel shave and wash (about 40% shave from 0700 to 0800 and the rest at other hours during the day or in the evening); (3) The 75% who do not shave in the peak period wash their hands and faces. Fifty per cent wash their teeth (other 50% wash their teeth after breakfast). One hundred per cent comb hair.

The average time consumed at the lavatory is four minutes per man. One lavatory will, therefore, accommodate 7.5 persons in the 30 minute peak period. Dividing the number of personnel by 7.5 gives the lavatory requirement for any given number of personnel. Table 4 indicates the requirement from one to 500.

A late afternoon peak load of 60-minute duration and an average showering time of 195 seconds were assumed in computing data for shower requirements (Table 5). A variation of the load factor with the climate was also taken into consideration assuming a 100 per cent use in peak period for tropical climate, 75 per cent for temperate and 50 per cent in arctic.

At 195 seconds per shower, one shower head will accommodate 18.5 persons during the peak hour. The number of personnel divided by 18.5 gives the number of heads required for the tropical situation. For temperate and arctic conditions, three-quarters and one-half respectively of the tropical requirement is used.

Resort Supermarket Needs Better-than-Average Air Conditioning

A "grocer's dream" is the owner's description of new Waldbaum Supermarket in Belle Harbor, N.Y. Its air conditioning system has to be better than adequate, since Belle Harbor is a summer resort and traffic is especially heavy in the store during the hot months. The fact that national sales statistics show that air-conditioned markets do 30.9% more business than non-air conditioned stores was brought out by the owner.

Selling area is approximately 102 ft by 114 ft, with a 15-ft hung ceiling. There are 277 lineal feet of open refrigerated display cases. The lighting load is 5 watts per sq ft. A main display window is 100 ft long.

These factors dictated an air conditioning system conhorizontal rear discharge, is coupled with a 450,000-BTU of heating. On the basis of efficiency, physical dimensions and economy it was decided to use two 25-ton packaged units and split them. Each low side unit, reworked for a horizontal rear discharge, is coupled with a 450,000-Btu duct heater and suspended from the ceiling in one section of the rear stock and work area. This particular area is 19 ft wide and has a 22-ft ceiling. It is mainly occupied by walk-in boxes. In order to conserve floor space, a steel platform is installed above the walk-in boxes, and the air conditioning units, in racks, are placed on this platform.

All heating and air-conditioning thermostats and switches are located in the store office in the main selling area. All electrical controls, magnetic starters, line switches, etc., are installed remotely on a panel centrally located between the two pieces of equipment.

Supermarket heat load requirements, at best, are a compromise between the many variables entering the picture and the economics of the supermarket operation. Under the circumstances, equipment furnished by Typhoon Air Conditioning Co., Div. of Hupp Corp., Brooklyn, N.Y., has proved quite satisfactory for the Waldbaum market, according to the installing engineer for Kold-aire Refrigeration Company, also of Brooklyn.

Curt Kornblau, director of research for Supermarket Institute, revealed that new supermarkets opening in 1956 averaged 21,200 sq ft, of which more than half that area is for selling. The Institute is conducting a research program, the complete report of which will be available.

Features of an above ground steam distribution system to serve the largest part of the U. S. Marine Corps Recruit Depot, Parris Island, S. C. Figures given on hot water demand per fixture in buildings.

Outside Steam Distribution Lines Serve Parris Island

HAROLD B. SWYGERT, JR.
Partner of Gillespie and Swygert, Consulting Engineers, Spartanburg, S. C.

NEARLY four miles of outside above ground steam and return mains were installed as part of an installation to deliver 80% of the steam requirements for an area known as the Main Side of Parris Island. The initial steam pressure supplied for the distribution system is normally 125 psig, which is supplied by either exhaust or extraction steam from four turbine generator sets.

The first step in the design of the distribution system consisted of collecting and correlating field data to determine the ultimate load to be placed on the system. Where an existing building was to be replaced by a future permanent structure, the larger of the two loads was used in all calculations. The total load on the steam system consists of the heating load, domestic hot water load, and the heat loss from the outside steam lines.

In determining the heating loads, design conditions of 15 deg F outside and 72 deg inside were established. Standard heat loss calculation was closely followed with due consideration given to the occupancy of the various types of buildings.

Hot Water Demand

Table 1 gives the hot water demand per fixture for various types of buildings and these figures were used to obtain the total hot water load. The total gallons per hour load is multiplied by the appropriate heating factor to determine the recovery rate of the heater in gallons per hour. Where a continual demand for hot water is anticipated, as in hospitals and laundries, two hot water generators are used.

The heat loss from the outside steam lines cannot be calculated until the exact routing and sizing of the lines are determined. However, for sizing the lines, an approximation between 5% and 10% of the tabulated load should be sufficient.

Exact routing of the mains should be determined with due consideration given to the locations of the buildings, flexibility, existing routing, and to the topography. With the routing determined, the magnitude of the load along the main can be found. For this particular job, it was found advantageous to follow the existing routing where practical, so as to fully utilize existing pipe supports and thereby minimize cost.

Pipe Lines

Knowing the load, the mains can be properly sized. The total pressure drop to be allowed was 75 psi, thus giving a pressure at the farthest point of 50 psig. Where branch lines were required, they were sized on the basis of 6,000 fpm maximum velocity. This was with the ex-

TABLE 1—HOT WATER DEMAND PER FIXTURE FOR VARIOUS TYPE BUILDINGS

Fixture	Administration	Quarters	Club	Barracks	Hospital
	Gallons per Hour				
Bathtub		15	15	15	15
Laundry Tub		35	25	35	35
Lavatories (Private)	3	3	3	3	3
Shower		100	200	150	100
Sink					
Kitchen		20	20	20	20
Service	30	20	30	30	20
Heater Recovery Rate Factor	0.20	0.15	0.15	0.20	0.20

Harold B. Swygert, Jr., received his B.S. in M. E., from Clemson College. He was employed by the engineering firms of Patchen and Zimmerman, Augusta, Ga.; Lockwood Greene, Inc., Spartanburg, S. C.; J. E. Sirrine Co., Greenville, S. C. At present he is a partner in the firm of Gillespie and Swygert, engineers, Greenville, S. C. He is a registered professional engineer in South Carolina, a member of ASME, and the National Society of Professional Engineers.

TABLE 2—BYPASS VALVES FOR STEAM MAINS

Line Size, In.	Bypass Size, In.
4 to 8	3/4
10 to 12	1
14 to 16	1 1/4
18 to 20	1 1/2

ception of hospitals, where 3,000 fpm maximum velocity was used.

All steam lines were pitched a minimum of 3 in. per 100 ft in the direction of flow. Since the condensate was pumped, the condensate lines were pitched a minimum of 3 in. per 100 ft in the same direction as the steam lines.

Due to wind loads, sometimes in excess of 100 miles per hour, and due to the relatively poor soil conditions, it was decided to keep the lines as close to the ground as possible. A minimum distance of 12 ft was decided on to allow adequate clearance for vehicular traffic beneath the mains. Where mains passed over main roads, a clearance of 16 ft was established.

Pipe Support

The steam and condensate mains, varying in size between 3 in. and 20 in., are supported from a common steel pipe as illustrated in Fig. 1. These pipe supports were constructed of 6 in. steel pipe and structural cross arms adequately sized to accommodate the load. The piping was hung from the cross arm with roller-type hangers to provide freedom of movement for pipe expansion. This movement, due to expansion, varies between 2½ to 3½ inches per 100 ft, depending on the amount of superheat present. Where required, details of the pipe support were changed to allow an anchor support, or a road-crossing support.

Installation

The entire piping system was analyzed carefully to assure adequate flexibility. Where possible, the routing of the mains was made to minimize the number of expansion loops required. Where expansion loops were necessary and used, the size required and the maximum thrust and stresses developed were determined mathematically. Anchors and guides were provided at all points they were required.

Standard weight black steel pipe was used for steam service. Extra heavy black wrought iron pipe was used for condensate service. Both the steam and condensate mains were insulated with calcium silicate of a thickness recommended by the manufacturer for outdoor installations. The insulation was covered with aluminum weatherproof jacketing.

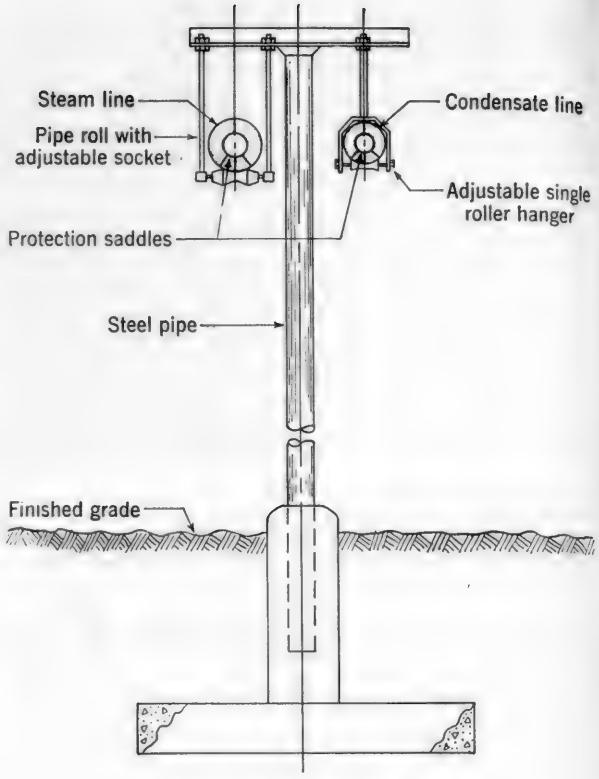


Fig. 1. Details of the Pipe Support.

Gate Valves and Bypass Valves

Gate valves were installed at strategic points along the mains for isolation of various sections requiring repairs. All gate valves on the steam main were provided with properly sized bypass valves. The purpose of the smaller bypass valves was to allow ease of operation in warming-up and putting line pressure on each ensuing section of piping. Sizes of bypass valves are listed in Table 2. The larger valves would be more difficult to open, due to the gate size and the unbalanced pressure.

Where steam loads developed from mess halls, laundries, and hospitals, steam interruption could only take place during certain stipulated hours. The entire new system had to be installed so as to keep maximum steam service to existing buildings.

Where applicable, it was decided to deviate slightly from normal practice and install the new steam line in the space occupied by the existing condensate lines. While this necessitated the wasting of condensate, a minimum interruption was made possible.

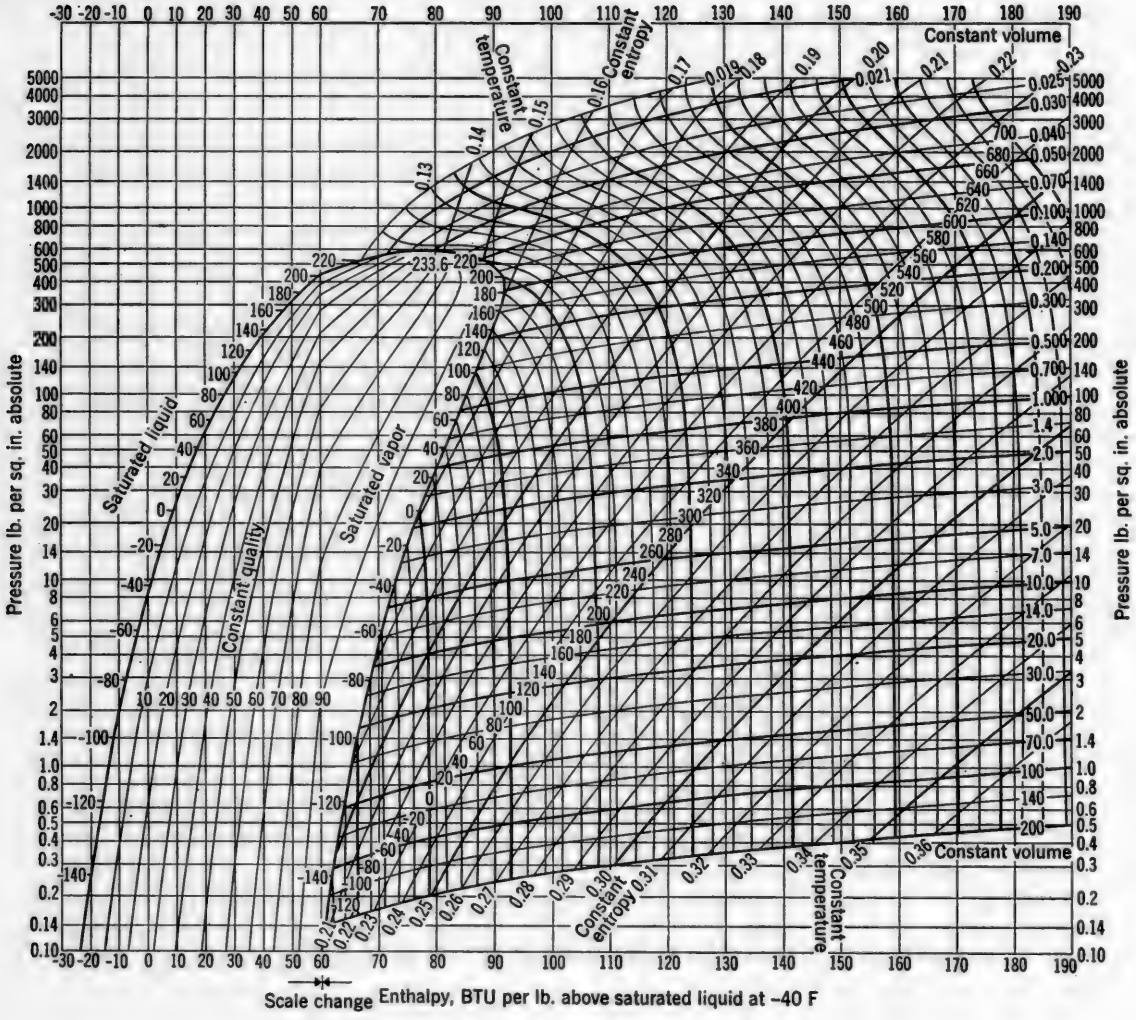
The completed system offers the maximum in flexibility for handling both the present load and the future load. The aluminum-jacketed lines offer an eye-appealing installation, requiring a minimum of maintenance and providing a maximum of service.

For companies exhibiting at the International Heating and Air Conditioning Exposition, see page 129.

SUPERHEAT DATA—FREON-12

Temp. of Saturated Vapor, Deg.	Degree of Superheat								
	40			45			50		
	Volume, Cu. Ft. per Lb.	Enthalpy, Btu per Lb.	Entropy, Btu per Deg. R.	Volume, Cu. Ft. per Lb.	Enthalpy, Btu per Lb.	Entropy, Btu per Deg. R.	Volume, Cu. Ft. per Lb.	Enthalpy, Btu per Lb.	Entropy, Btu per Deg. R.
−10	2.1810	81.89	.1820	2.2064	82.62	.1835	2.2318	83.34	.1849
−5	1.9801	82.48	.1815	2.0032	83.21	.1830	2.0262	83.95	.1844
0	1.7793	83.08	.1810	1.8000	83.81	.1825	1.8207	84.55	.1839
5	1.6222	83.67	.1805	1.6412	84.41	.1820	1.6601	85.15	.1834
10	1.4652	84.26	1801	1.4824	85.00	.1815	1.4995	85.75	.1830
12	1.4156	84.49	1799	1.4322	85.24	.1814	1.4487	85.99	.1828
14	1.3660	84.72	1798	1.3820	85.48	.1812	1.3979	86.23	.1826
16	1.3163	84.96	1796	1.3318	85.71	.1811	1.3472	86.47	.1825
18	1.2667	85.19	.1794	1.2816	85.95	1809	1.2964	86.71	.1823
20	1.2171	85.43	.1793	1.2314	86.19	.1807	1.2456	86.95	.1822
22	1.1775	85.66	1791	1.1914	86.42	.1806	1.2051	87.18	.1820
24	1.1379	85.89	.1790	1.1513	86.65	.1805	1.1647	87.42	.1819
26	1.0983	86.12	.1789	1.1113	86.89	.1803	1.1242	87.66	.1818
28	1.0587	86.35	.1787	1.0712	87.12	.1802	1.0837	87.89	.1816
30	1.0191	86.58	.1786	1.0312	87.36	.1800	1.0433	88.13	.1815
32	.9871	86.81	.1785	.9989	87.59	.1799	1.0106	88.37	.1814
34	.9552	87.04	.1784	.9665	87.82	.1798	.9779	88.60	.1812
36	.9232	87.27	.1782	.9342	88.05	.1797	.9452	88.84	.1811
38	.8912	87.50	.1781	.9019	88.29	.1796	.9125	89.07	.1810
40	.8592	87.73	.1780	.8695	88.52	.1794	.8798	89.31	.1809
42	.8333	87.96	.1779	.8433	88.75	.1793	.8533	89.54	.1808
44	.8073	88.18	.1778	.8170	88.98	.1792	.8267	89.77	.1807
46	.7813	88.41	1777	.7908	89.21	.1791	.8002	90.00	.1806
48	.7554	88.64	1776	7645	89.44	.1790	.7736	90.24	.1804
50	.7294	88.86	.1775	.7382	89.67	.1789	.7471	90.47	.1803
52	7081	89.09	1774	.7167	89.89	.1788	.7253	90.70	1802
54	.6868	89.31	1773	.6952	90.12	.1787	.7035	90.93	.1802
56	.6655	89.54	.1772	.6736	90.35	.1786	.6817	91.16	.1801
58	.6442	89.76	.1771	.6521	90.57	.1785	.6600	91.39	.1800
60	.6229	89.98	.1770	.6305	90.80	.1784	.6382	91.62	.1799
62	.6053	90.20	.1769	.6127	91.02	.1784	.6202	91.84	.1798
64	5877	90.42	1768	.5949	91.24	.1783	.6022	92.07	.1797
66	5701	90.64	1767	5771	91.47	.1782	.5842	92.29	.1796
68	.5525	90.86	.1767	5593	91.69	.1781	.5662	92.52	.1796
70	.5349	91.08	.1766	.5415	91.91	.1780	.5482	92.75	.1795
80	.4616	92.16	.1761	.4662	93.01	.1776	.4734	93.86	.1791
90	.4003	93.22	.1759	.4055	94.09	.1774	.4107	94.95	.1788
100	.3485	94.25	.1756	.3532	95.14	.1771	.3579	96.02	.1786
120	.2670	96.25	.1752	.2708	97.17	.1767	.2747	98.09	.1781
140	.2071	98.11	.1747	.2103	99.07	.1762	.2135	100.04	.1777
160	.1620	99.80	.1743	.1648	100.82	.1758	.1676	101.84	.1774
180	.1277	101.28	.1738	.1302	102.36	.1753	.1327	103.45	.1769

PRESSURE–ENTHALPY CHART—FREON-12



The above Mollier chart on Freon-12 covers an exceptionally wide range. It is based on the properties of this refrigerant compiled and published by the manufacturer, Kinetic Chemicals Division, E. I. duPont de Nemours, copyrighted by that company, and reproduced here by permission.

In the saturated vapor region in the left portion of the chart, the horizontal figures interpolated between the pressure coordinates and skirting the entire saturated vapor area, are temperatures, in deg. F. In this same area, the horizontal figures on the lines slanting upward to the right designate per-cent quality lines.

In the superheat region, occupying all of the chart to the right and by far the greater part of the whole chart, the lines sloping slightly upward to the right are lines of constant specific volume and ranging in value (at the extreme right) from 200 at the bottom to 0.019 at the top. In the same region, the lines sloping to the left from vertical are temperatures.

Lines in the superheat region sloping upward to the right at about a 45° angle are lines of constant entropy with the scales given near the lower axis (from 0.21 to 0.36) or near the top of the chart (0.13 to 0.23). Horizontal lines are, of course, pressure and vertical lines are enthalpy.

Calculating the Heat Requirements of a Snow Melting System

Part 6 — Northeast Region

WILLIAM P. CHAPMAN

This is the sixth article of a series which will eventually cover all parts of the U.S. where snow melting systems are likely to be used. The first article summarized the basic equation for heat required for snow melting and defined the free area ratio as the ratio of slab area free of snow to total slab area. In order that each installment of this series can be understood, the classification of systems and explanation of the four tables are repeated.

THE total heat output of a snow melting system depends on the rate at which it melts the snow, and this rate in turn depends on the relative importance of rapid snow removal among the different types of applications. Snow melting systems can be classified as follows:

Class I (minimum): Residential walks or driveways and interplant areaways;

Class II (moderate): Commercial (stores and offices) sidewalks and driveways and steps of hospitals; and

Class III (maximum): Toll plazas of highways and bridges, and aprons and loading areas of airports.

These classifications depend upon the allowable rate of snow melting. For example, a residential system does not have to melt snow as rapidly as a commercial system. In fact, a depth of snow of an inch for an hour or so during a heavy storm might not be objectionable with a residential system. On the other hand, a store manager would claim the system was inadequate if half an inch accumulated on the sidewalk in front of his store. The difference, then, between a Class I system and a Class II system is in the ability of each system to melt snow. The one feature that is common to all classes is that the systems must be adequate for some combination of weather factors. Or, the designer wants to be able to say that he will pay to melt snow whenever conditions are milder than some critical value but he is willing to have an inadequate system for a given fraction of the time. In other words, the designer will run a calculated risk providing he knows the odds of that risk. For a residential system, where initial cost must be at a minimum, the designer must accept more frequent snow accumulations.

TABLE 1—GENERAL INFORMATION ON SNOWFALL, NORTHEAST REGION

Item	Buffalo-Niagara Falls, N. Y.	Burlington, Vt.	Caribou-Limestone, Me.
Approximate mean number of days with an inch or more of snow on the ground	95	140	110
Average number of inches of snowfall per year	74.4	65.4	102.3
Greatest snowfall in 24 hours, inches	24.3	24.2	18.2
Greatest depth of snow on the ground, inches	32.0	27.0	51.0
Mean number of days per year with snowfall of 1 inch or more	22 (99 with trace or more)	20 (89 with trace or more)	31 (64 with 0.1 in or more)

Naturally, the owner is not concerned about an explanation of why there is an accumulation of snow on the sidewalk. It is immaterial whether the accumulation is due to excessive snowfall or whether it is due to an extremely cold snowfall. In both cases, the ultimate reason is that an inadequate flow of heat is reaching the surface. The true analysis of heat output, then, depends on an analysis of the weather. This is true of all three system classes.

The total heat requirements of a snow melting system are determined, therefore, by (a) the total area of the snow melting slab, (b) the rate at which the snow is to be removed, and (c) the values and frequency distribution of each of the pertinent climatic variables (humidity, wind, temperature, and snowfall). Obviously (c) varies from city to city and, due to the complexity and number of calculations to obtain a frequency distribution of the four variables, the evaluation of (c) has been virtually impossible. However, by the use of punched cards and statistical tabulating machines, data have been derived so that the heat requirements for a given city can be simply presented.

The designer needs two types of information. First, the most severe combinations of variables on which to base his *design output*, and second, the heat required over the season so that *operating costs* can be determined. These data are given in Tables 1, 2, 3, and 4 which follow and which cover three cities in the Northeast region of the U. S.

Table 1

The first table gives some generalized information on snowfall and snow on the ground. The next to last item, "Greatest dept of snow on the ground" indicates the greatest depth to which snowfall has ever accumulated. Other items are self-explanatory.

Table 2

Table 2 contains the operating information of a snow melting system. For freezing temperatures (32 deg and

TABLE 2—DATA FOR DETERMINING OPERATING CHARACTERISTICS OF SNOW MELTING SYSTEMS IN THE NORTHEAST REGION[1]

Period of No Snowfall

City	Air Temperature, Deg. F[2]: Over 32	Air Temperature, Deg. F[2]: Below or Equal to 32	Mean Temperature During Freezing Period[6]	Wind Velocity, Freezing Period,[6] mph
	Per-cent of Winter Hours with No Snow at Above Temperatures			
Buffalo-Niagara Falls N. Y.	46.5	46.9	23.9	10.8
Burlington Vt.	39.0	54.5	19.6	10.8
Caribou-Limestone Me.	21.4	70.6	16.5	10.0

Period of Snowfall[3]

City	Hours of Snowfall[3]: Per-cent	Hours of Snowfall[3]: Hr. per Year	Free Area Ratio, A_r	Required Output, Btu per Sq. Ft. per Hr.[4]: 0–49	50–99	100–149	150–199	200–249	250–299	300–349	350–399	400–up	Maximum Output, Btu per Sq. Ft. per Hr.
				Frequency Distribution of Snowfall Hours at Above Outputs, Per-cent[5]									
Buffalo-Niagara Falls, N. Y.	6.6	240	1	50.7	32.6	11.2	3.7	1.4	0.2	0.2	—	—	309
			0	95.9	3.4	0.2	0.5	—	—	—	—	—	192
Burlington, Vt.	6.5	236	1	53.7	29.9	13.2	2.5	0.6	0.1	—	—	—	280
			0	91.8	7.6	0.6	—	—	—	—	—	—	142
Caribou-Limestone, Me.	8.0	290	1	35.0	39.7	16.0	5.7	2.0	1.0	0.5	0.1	—	378
			0	92.0	7.5	0.5	—	—	—	—	—	—	138

[1] The period covered by this table is from Nov. 1 to March 31, incl., with February taken as a 28¼ day month. Total hours in period = 3630.
[2] The percentage in Columns 2 and 3 plus the percent under operating time total 100%. Note that "Hours of Snowfall" does not include idling time, and is not actual operating time. See text.
[3] Snowfalls of trace amounts are not included; hence, "Hours of Snowfall" includes only those hours of 0.01 inches water equivalent per hour snowfall.
[4] Output does not include allowance for back or edge losses since these depend on slab construction.
[5] Percentages total 100% of the number of hours per year of snowfall.
[6] "Freezing Period" is that during No Snowfall when the air temperature is 32 deg or below.

below) but no snowfall the system may be "idling." That is, the designer may want to supply some heat to the slab so that there will be immediate melting when snow starts to fall. The column on mean temperature gives the average temperature during *freezing* temperatures. This temperature is used in calculating the "idling" load. The other term needed to calculate idling load is the wind velocity during the period of freezing temperatures.

The column "Hours of Snowfall" indicates the number of hours that snow is falling at rates equal to or greater than 0.01 inch of water equivalent per hour. Roughly speaking there are snowfalls of "trace" quantities about twice as often as there are for measurable quantities of 0.01 inch or more. It is assumed that these light falls can be handled by the idling load.

The remaining columns of Table 2 represent the frequency distribution of required heat output. This distribution is based on the solution to the basic equation for two values of the free area ratio A_r. This distribution represents the heart of the analysis and is also the basis for Tables 3 and 4.

Table 3

Table 3 contains the *design* heat requirement—as explained in the footnotes to Table 3. These design rates may be altered by the designer if he feels that a particular job should have a different design criterion from those given in the footnote. Any change in design selection should be based on the frequency distribution given in Table 2.

Table 4

Table 4 contains the data required to estimate the operating cost of a snow melting system. The footnotes to Table 4 explain the various items.

Use of the Tables

Example. Assume that you have assigned two engineers to select the required output for a snow melting system for automobile traffic. You have decided that 25% will be adequate for back and edge losses. One engineer submits a figure of 250 Btu per hour per sq ft and the other submits a figure of 375 Btu per hour per sq ft.

TABLE 3—DESIGN DATA FOR SNOW MELTING SYSTEMS, NORTHEAST REGION

City	Design Output, Btu per (Hour) (Sq Ft)		
	Class I System[1]	Class II System[2]	Class III System[3]
Buffalo-Niagara Falls, N. Y.	80	192	307
Burlington, Vt.	90	142	244
Caribou-Limestone, Me. ..	89*	138	307

[1] For Class I (residential) Systems, the design output is set at that required heat output (see Table 2) when $A_r = 0$ at the 98th percentile of the frequency distribution; that is, where 98% of the hours have this output or less.

[2] For Class II (commercial) Systems, the design output is the maximum output when $A_r = 0$ in Table 2 (last column).

[3] For Class III (industrial) Systems, the design output is determined by the following four requirements: (1) Output is never exceeded for two consecutive hours; (2) Output for $A_r = 1$; Table 2, is at least 1 Btu per hour per sq ft greater than maximum output for $A_r = 0$; (3) A_r is greater than or equal to 0.5 the maximum requirement shown in Table 2 for $A_r = 1$. That is, $q_d = q_s + q_m + 0.5\ (q_e + q_h)$ for the conditions where $q_t = q_s + q_m + q_h + q_e$ are a maximum; (4) The free area ratio A_r is unity for at least 98% of the hours listed in Table 2.

* See Table 4. Idling Rate is greater than Design Rate.

Their arguments go something like this: Mr. Small argues that automobiles will not be out in heavy snowstorms, hence a Class II system is adequate; furthermore an output of 200 is adequate for 98.2% of the snowfall (see Table 2). An additional 50 Btu per hour per sq ft provides 25% back loss.

Mr. Bigg is aware of Small's reasoning and has in fact considered it. He argues, though, that public conveyances will be out in the worst weather, and in addition so will such vehicles as fire engines, ambulances and other vehicles on emergency calls. As a result Bigg votes for an output of 300 plus 75 for back losses. In addition, Bigg points out that operating costs for a Class III system are 14,900 Btu per year per sq ft and 14,600 for a Class II. Surely such a slight increase in operating costs are warranted for the added protection of emergency travel.

The writer believes that Bigg's reasoning is superior to Small's, but would agree with Small that an output of 250 is adequate for Buffalo. This opinion is based on an extension of Bigg's reasoning. A careful examination of Table 2 indicates that an output of 200 Btu per hour per sq ft always will provide a free area ratio greater than zero. In other words, snow will not accumulate; furthermore, frequencies of 0.002 for rates above 240 indicate that a Class III rate of 307 is based on rule 1, footnote 3 of Table 3, and probably for one unusual storm every four years. True, two consecutive hours would be bad, but since the snow cannot be accumulating, A_r must still be above zero but less than unity. In other words, the rate of 307 is due to high winds and low temperatures rather than heavy snowfall. Emergency vehicles would have to be driven carefully, but they would not be stalled. It seems adequate, then, to select the design rate at 200 Btu per hour per sq ft and allow for back and edge losses. Mr. Small gains his point, even though he had a weaker argument.

Northeast Region

The Northeast Region really can be called the "snowbelt of the United States"; no other region has as much snowfall. In addition, however, this region is quite heavily populated, especially the Mohawk Valley region between Buffalo and Albany.

This region has been defined arbitrarily by the U.S.-Canadian border on the north and east, and the New York-Pennsylvania border on the south and west. At the Hudson the boundary turns north to the Massachusetts line then east to the Connecticut Valley and along the Valley and finally turns east to the Atlantic Coast to include Augusta, Me. The cities of Buffalo, Burlington, and Caribou were chosen to represent this region, but really the region should be considered as three similar sections. The shoreline of Lake Ontario south and east to the Appalachian Mountains and the Mohawk Valley east to Albany is represented by Buffalo. The Hudson River Valley and Champlain Valley form a *Y* bounded by the Appalachians on the west and the Green Mountains on the east, with the Adirondacks rising steeply in the north of the *Y*. This area is represented by Burlington, Vt. Cities such as Albany which lie between Buffalo and Burlington, more closely resemble Buffalo in snowfall pattern.

The northeastern section of this region is represented by Caribou, and here there is considerable difference in weather. The Green Mountains, and especially the White Mountains of New Hampshire, isolate the piedmont dis-

TABLE 4—YEARLY OPERATING DATA, NORTHEAST REGION

City	Idling			Melting		
	Time,[1] Hr. per Year	Rate,[2] Btu per (Hour) (Sq. Ft.)	Output,[3] Btu per (Year) (Sq. Ft.)	Time,[4] Hr. per Year	Class	Output[5] Btu per (Year) (Sq. Ft.)
Buffalo-Niagara Falls, N. Y.	1702	50.2	85,500	240	I	11800
					II	14600
					III	14900
Burlington, Vt.	1978	76.9	152,000	236	I	11800
					II	13500
					III	13800
Caribou-Limestone, Me.	2563	93.0	238,000	290	I	17800*
					II	20600
					III	22500

[1] From Table 2, Column 3 × 3630 (hr per year).
[2] Rate when idling, Btu per (Hr) (Sq Ft) = (0.27V + 3.3) (32 — t), where V = wind velocity from Column 5, Table 2, and t = air temperature from Column 4, Table 2.
[3] Product of the two preceding columns.
[4] Hours of Snowfall, from Column 7, Table 2.
[5] Based on the condition that surface temperature is maintained at 33 deg until required output exceeds design output, at which time design output is used regardless of required output. Distribution of required output based on Table 2.
* Based on Idling Rate rather than Design Rate.

trict of eastern Maine from the west. On the other hand, the area north of Augusta is too far removed, climatically and geographically, from New England to be considered in the same region with Boston.

All three cities, Buffalo, Burlington and Caribou, however, have the typical weather pattern of the northeastern United States; that is, the weather is varied and changeable. In general, the winters are prolonged and moderately cold with considerable snowfall. This is indicated by the fact that both Buffalo and Burlington have nine months with mean monthly temperatures below 65 deg. and Caribou has 10. Buffalo has the mildest winter with 6340 degree days per year, and Burlington and Caribou have 7751 and 9740, respectively.

The mildness of Buffalo's weather can be attributed to the proximity of Lakes Erie and Ontario. Both lakes have heavy ice accumulations hence spring weather is delayed, but on the other hand the prevailing wind blows in from the southwest over Lake Erie. The result is that cold air masses are warmed 10 to 20 degrees. The same is true of the polar air masses passing over Lake Ontario.

Much of the heavy snowfall in Buffalo, and eastward along the Mohawk Valley to Albany, is caused by cold air masses passing over the warm humid air of Lakes Erie and Ontario. The moisture freezes and is blown in shore and dropped as snowfall.

Somewhat similar conditions occur at Burlington because of Lakes George and Champlain. The main effect of the Lakes is to extend the growing season to about 150 to 160 days per year, which reduces the length of the winter season. Because of the Adirondacks to the west and the Green Mountains to the east, the prevailing wind is from the south and passes over Lakes George and Champlain before reaching Burlington. As in the case of Buffalo, this causes added snowfall.

The winter starts its icy grip on Burlington toward the end of November, but by April the mean monthly temperature is up to 42.3 deg. January is the coldest month with an average temperature of 17.9 deg. The average winter has 19 days with minimum temperatures below zero and 148 below freezing—69 of which have *maximum* temperatures below freezing. This accounts for the high number of days (140) with snow on the ground. Of the 33 cities studied in this series only Duluth and Burlington have 140 days per year with snow on the ground.

Caribou is near the eastern edge of northern Maine in Aroostook County. It is 46°52′ north latitude—about the same as Duluth and Olympia Wash. Unlike the rest of this region, it does not have a body of water to the west. The Appalachian Mountains are ineffective as a barrier to the flow of Arctic air masses. As a result, the winters are long, cold, windy and accompanied by over 100 inches of snow. The extreme low temperatures (based on merely 17 years of record) are not as cold as one would expect, but are frequent—190 days with minimum below freezing and 44 below zero. The mean monthly temperature for January is 8.7 deg. and for February 9.8 deg. On the other hand, in October the mean monthly temperature is 42.1 and in April it is 34.7 deg.

An interesting feature of Table 2 is the consistent frequency of hours of snowfall per year for the three cities. The average for the three cities is 255 hours per year with a high of 290 for Caribou and a low of 236 for Burlington. Only Saulte Sainte Marie, Mich., of the 33 cities studied, with 345 hours per year, has a greater frequency of snowfall. Obviously, then, the Northeast region is the best market for snow melting systems.

Buffalo is a particularly good market. It is a large city with a snowfall of nearly 75 inches per year. The snow stays on the ground about 95 days and about a fourth (22) of these days have falls of at least one inch. A trace is recorded on the average of 99 days per year, which is just over half the number of days in the cold season. It is likely, then, that a snow melting system would operate about 700 hours per year during 99 days. In Caribou the operating time would be even longer.

Table 3 illustrates the good distribution of load. In the case for Buffalo, however, the Class III design rate obviously was determined by rule 1, footnote 3, of Table

3. Upon examining Table 2 one can see that the distribution drags out (skewed to the right). It is quite likely then that outputs in excess of 250 Btu per hour per sq ft are infrequent and of short duration. Such a distribution is not likely in Burlington or Caribou.

Notice that the idling rate as listed in Table 4 for Caribou is 93.0 Btu per hour per sq ft and only 89 for Class I design rate as shown in Table 3. It seems to be better practice to select 93 as the design rate (a more detailed discussion of similar conditions can be found in the January, 1957, issue for Great Falls, Mont., and Rapid City, S. D.).

Although the frequency of snowfall is remarkably consistent for the three cities, the operating costs are considerably different. The reason can be determined by inspecting Table 2. The loads for Buffalo are concentrated heavily in the lower values between 0 and 49, whereas the loads for Caribou have a better distribution —the modal value being somewhere between 50 and 99 Btu per hour per sq ft. The load pattern for Buffalo is probably due to the large number of snowfalls resulting from cold air passing over the warmer waters of Lake Erie. Such falls occur at temperatures between 26 and 32 deg. and do not represent high melting loads. The storms at Caribou, on the other hand, occur at lower temperatures and require higher slab output.

In summary, the Northeast region is an excellent area for snow melting. Many applications would be adequately served with less than 100 Btu per hour per sq ft output. This results in operating costs somewhere between 10,000 and 20,000 Btu per sq ft per year. Since operating times are about 700 hours per year for nearly half the fall and winter days, snow melting is more of a necessity than a luxury.

Air Conditioning of Factories Is a Must

Some interesting current industrial applications of air conditioning were reviewed by E. H. Norling, Air Conditioning Div., General Electric Co., Bloomfield, N.J., at a forum for industrialists held last month in Newark.

In the manufacturing or processing of materials which readily absorb *moisture*, such as textiles, paper, wood, leather, tobacco and food stuffs, the tempertaure and relative humidity of the air have a marked influence upon the rate of production and upon the weight, strength, appearance and general quality of the production.

It is essential in the manufacture of *rayons*, where pulp sheets are conditioned, cut to size and passed through a mermerizing process, that close control of both temperature and relative humidity is maintained. Temperature controls the rate of reaction directly while controlled humidity maintains a constant rate of evaporation from the surface of the solution and maintains a solution of known strength throughout the mercerizing process.

In the dough room of the modern bakery, yeast develops best at a temperature of 80°. This is an example of control of rate of a *biochemical reaction*. A relative humidity of 70% is maintained to hold the surface of the dough open to allow the carbon dioxide gasses formed by the fermentation to pass through and produce a baked loaf of even, fine texture without large voids.

Control of the rate of *crystallization* is necessary in the coating process for medical pills. As the solution evaporates, each pill is covered with crystals of sugar. A smooth opaque coating is only accomplished by blowing over the pills the proper amount of air at the right temperature and humidity. If the cooling and drying are too slow, the coating will be rough and semi-translucent and the appearance unsightly. If the cooling and drying are too rapid, the coating will chip.

Where *close tolerances* must be held, within 2 or 3 ten-thousandths of an inch as in the manufacture of precision instruments, temperature variation may cause expansion and contraction of material and machines to an extent that will seriously affect the quality of the work. Here the actual level of the temperatures is less important than the requirement that the temperature be constant.

Dew-point temperature is critical for protection of *highly polished* surfaces. It is essential that perspiration and sweating hands be avoided. Further, this type of manufacturing usually requires an exceptionally fine job of air filtering to avoid abrasion of the surfaces by dust.

Presence of *static electricity* is often detrimental to the satisfactory processing of lightweight materials such as textile fibers and paper. It is also extremely dangerous where explosive atmospheres or materials are present. This hazard may be considerably reduced by increasing the relative humidity to at least 55% and, if possible, even higher to 65%.

For close control of *material testing*, it is essential that constant conditions of temperature and humidity be maintained, to get reliable results.

As living and working conditions continue to improve so rapidly, air conditioning for the *health and comfort of employees* takes on added importance. Wages are increasing while working hours are lessening and any improvement which contributes to the general happiness and well-being of workers today is, indeed, an important asset in keeping any plant at peak production. We should never forget, either, that more comfortable, healthier employees working more efficiently means a greater output with much greater profit. Comfortable employees are less inclined to seek jobs elsewhere. Costs incurred in selecting and training replacements are held to a minimum. The requirements for the health and comfort of employees are relatively standard and do not vary widely as we found in the case of manufacturing processes. Our basic design problem, therefore, is somewhat simplified.

Notwithstanding the numerous benefits of industrial air conditioning, not more than 1% of the nation's industrial plants are air conditioned, and yet the ratio of square footage in use as compared to office buildings is 50 to 1.

"But this picture will change rapidly in the next few years," Mr. Norling concluded, "due to competitive pressures and the demands of the employees. We are living in a modern competitive system, and the factors of competition operate in a factory just as they do in the office building, hotel, or shopping center. So it is inevitable that a very large percentage of modern production facilities in this country will be air conditioned soon, and by 1976, practically all American industrial plants will be fully air conditioned. The primary reason will be 'Survival'."

Abner and the Unseen Forces

E. J. UPDRAFT
Partner in Sketchwell and Updraft, Engineers

ONE morning Miss Fanny was telling M'Uncle Abner about the Huguenot torte, which is a rich Charleston dessert, and how she was planning to eat some to build up her figure.

"You better come by my house tonight, and try some too, Mr. Abner. You look right lanky and peaked, like Abraham Lincoln after Bull Run, which comes from working so hard, and eating around by yourself, and not getting the right food, and all."

"Are you a-proposin' to me, Miss Fanny?" asked M'Uncle Abner, which made her pretty face turn quite red. But before she could think up an answer, in came the president of the new City District Steam Company.

"Abner," he said without so much as a polite "excuse me" to Miss Fanny, "I'm in sad trouble." Then he put on the desk a crude wooden carving of a man, about three inches high, with pins stuck in it.

"And what the heck," asked M'Uncle Abner, "is this?"

"This," said the president, turning the doll around, "is me. See? My name is on it." and he pointed to a sticker on the back which read "Sylvester Piper."

Then he dropped into a chair and wiped his worried-looking, apple-round face.

"Abner, you know I lived in the West Indies for a time, and I know voodoo when I see it. Somebody is trying to destroy me by destroying my business." He handed M'Uncle Abner a letter from the Investment Building which stated they would discontinue steam service two days after date, because the steam company was flooding their radiators with hot water, instead of furnishing the steam they were paying for.

"Well," said M'Uncle Abner, "why don't you give 'em steam?"

"I do give them steam," shouted Mr. Piper. "I give them good, superheated steam." He was so loud about it, Miss Fanny had to put her fingers in her ears. "The trouble is, this blankety-blank voodoo has suspended the force of gravity in their blankety-blank heating system, and the damned condensate from the radiators won't run off to the sewer as it should. Abner, this publicity will ruin me, make me look dishonest. But how can I fight forces I can't see?"

He wiped his perspiring face with a handkerchief that was already soaked, and breathed as hard as if he'd just run up the Washington Monument.

"Sylvester," soothed M'Uncle Abner, stretching his long legs," I reckon even voodoo couldn't make Mr. Newton's apple fall upward, or your condensate run up a vertical pipe. You're not hexed by unseen forces, you're hexed by a bad trap, or defective vent valve, or a busted check, or something else made by man."

Then he called to Miss Fanny.

"Please, Ma'am, will you kindly bring a couple of cups of coffee from the machine for Mr. Piper and me? Bring 'em good and hot, too, so I can demonstrate how superheated vapor and a liquid can live side by side in the same container."

"I know all about superheated vapor," said Mr. Piper impatiently. "So don't lecture on the vapor coming off the coffee. We've checked every line trap, and made a calorimeter test right at the reducing valve. Got ten degree superheat, and no water coming in from the street main. I tell you Abner, my engineers have checked every inch of their heating system, and they found nothing wrong, absolutly nothing. Peculiar thing is, sometimes the condensate drains off fine, no trouble at all. Then for hours it either stops entirely or barely trickles through the meter and the radiators fill up and the place gets cold. Abner," and he tapped M'Uncle Abner on his chest, "I want you to find the man who's sending me these dolls, so I can wring his neck. Then you'll see a system that works."

M'Uncle Abner set down his coffee cup with an emphasis unusual for him, and he titled back in his chair and his Abraham Lincoln's dark eyes regarded Mr. Piper sternly.

"Frankly," he said, "I don't care a dog's bark who's making your silly dolls, and I'm not about to go hunting for him, either. Also, I don't believe your statements about gravity being set aside by voodoo or anything else,

but I'm willing to waste an hour and go look at your returns myself."

Then M'Uncle Abner unravelled his long legs, and he stuffed his black instrument bag with this and that, and he went with Mr. Piper to the Investment Building. There they found the building engineer, an old man named Gaskit, engaged in draining a downcomer with a hose leading to the sewer.

Mr. Piper almost knocked the old man over in his haste to stop this loss of his condensate.

"Gaskit," he yelled, "Do you know that by-passing my meter is a criminal offense? I ought to put you in jail for this."

"I ain't scared," said the engineer. "You don't want people to hear about you givin' out water instead of steam, so you don't dare lock me up. And how'm I goin' to get any heat in radiators that are full of cold water?"

While this argument was going on, M'Uncle Abner got out his throttling calorimeter, and he hooked it up to a connection ahead of the reducing valve, and pretty soon a little vapor showed in the air. A few minutes later M'Uncle Abner announced that the incoming steam was dry.

"Over seven degrees superheat," he told them. "You're getting steam at the valve, Mr. Gaskit, and not hot water. We've got to look elsewhere for the trouble."

Then he made a further remark.

"Sylvester, you noted that the water ran off freely from the bottom of the downcomer, when Mr. Gaskit had his hose on it. Do you still think the condensate is running upward?"

"That was in one downcomer only. Solve the mystery in a piece, Abner, and not piecemeal."

M'Uncle Abner sighed and turning to the building engineer addressed him thusly:

"Mr. Gaskit, I reckon you've been around here a long time. Ever have this trouble before?"

The old man shook his head.

"I been here 40 years, and never had no trouble with the boilers. All started when this gent began pumpin' water into the radiators instead of steam."

"Are you retirin' soon, Mr. Gaskit?"

The old man's wrinkled face donned a gleeful smile.

"Not now, I ain't. Not since they decided to put back the boilers. They figured anybody could run the street valve, and were goin' to put me out to grass, but boilers are different. Takes an engineer for boilers, and I know more'n most. Used to run the electric system too, when the building had its own light plant."

M'Uncle Abner next inspected the meter. It was a conventional, bucket type of weighing meter, with a cooling radiator just ahead of it in the return system, and the discharge went visibly to the sewer. Only at this moment there was no discharge, and no evidence of condensate flowing into it, so M'Uncle Abner took out his stethoscope and listened to the radiator, and he couldn't hear anything at all.

"The condensate is not moving," he said. "I'll go over the piping, foot by foot."

He started at the far end of the basement and every foot or two, laid his hand on the return pipe. At first it was hot, then it became cooler and cooler, indicating the pressure of a stoppage somewhere, so he took out his little testing hammer, and he tapped gently on every fitting along the line, listening meanwhile to the adjacent piping with his stethescope.

"Sometimes," he said, "foreign material will hang up where the flow changes direction in a tee or ell, and sometimes it lies in the bowl of a valve. Occasionally, I can recognize it by the sound, and sometimes the tapping even frees it, and I can hear it move."

But he travelled all the way to the check valve, which was near the meter, and he didn't find a thing. A big white and yellow cat was sleeping against the piping, with its head practically on the valve, and it was a pet apparently and wouldn't move until M'Uncle Abner all but booted it out of the way.

"Durn cat," said Mr. Gaskit, "sleeps there all the time. Almost too old and lazy to chase mice."

M'Uncle Abner put his hand on the check valve, and it was warm from the cat's body, and suddenly it com menced to get warmer and warmer. Then they all heard some clicks in the meter, and suddenly for no visible reason, they saw that condensate had begun to run into the meter, and it was racking up dollars for Mr. Piper.

"Well Abner," said the steam company man with an I-told-you-so-expression, "Why does it run now?"

"I have a suspicion," nodded M'Uncle Abner thoughtfully. "And it concerns the check valve. Why is the check valve there? And when was it opened last?"

"It's there," said Mr. Piper, "because Mr. Gaskit, here, insists."

"I need it for my boilers," said the engineer stubbornly. "Ain't takin' out more than I have to, because this steam from the street ain't workin', and we've got to fire up the boilers again, day after tomorrow."

"Your other question," said Mr. Piper, "was answered last week. We put in a new check valve, just to be sure. It's an all iron, swing check, the simplest, most fool proof thing we could buy."

"And you've checked all the radiator vent valves? Sure they are breaking vacuum as they should?"

"Go look for yourself," Mr. Piper said wearily, with the attitude of a man who has tried everything.

"No good to look now," said M'Uncle Abner thoughtfully. He held out a dollar bill to Mr. Gaskit. "Will you call me at my office the next time the system becomes waterclogged? I'll come right over."

"I don't need no bribe," said the old man taking the bill anyway.

M'Uncle Abner ther sent Sylvester Piper about his business and went back to his own office where he hoisted his No. 12 shoes to a pulled out desk drawer, and called Miss Fanny for dictation. He started this way:

1—Heating system in Investment Building is a conventional 2-pipe layout with thermostatic traps and vent valves on each radiator.

2—Erratic operation did not begin until boilers were cut out and street steam was cut in.

3—Something is holding back the returns, almost certainly an unbroken vacuum. But how can all the vent valves in the whole

system possibly hang up in unison.

This unlikely situation caused him to lean back in his chair, and contemplate the pale, late-autumn sky, which looked as cold as the radiators in the Investment Building. He was silent so long, that Miss Fanny said:

"You stuck, Mr. Abner?"

His deep-set, dark eyes looked at her calmly.

"I'm never stuck, Miss Fanny, just misled, somehow. Do you believe in unseen forces? Some force that could hold up a lot of water?"

Miss Fanny's pretty head bobbed up and down emphatically.

"Course I do. I see one every day, when the door of my apartment house is opened for me by an electric eye. Isn't that an unseen force? Once some pigeons kept flying back and forth after some corn a boy was throwing to them, and the electric eye almost became cross-eyed trying to keep up with the shadows of the pigeons. Don't you believe in unseen forces, Mr. Abner?"

A quiet smile made itself comfortable on M'Uncle Abner's bony face.

"Miss Fanny," he said solemnly. "The wisdom of the ages is yours, not mine. I've been thinking only of the unseen forces of darkness, of voodoo, and neglected my own field, science. Gravity is an unseen force, so is electricity, and the movement of heat from a warm source to a cooler body. Why, there are dozens of them. But which one is holding back the returns from the Investment Building?"

He rocked back and forth in his chair, his eyes unseeing, and his face showing the same deep concern that characterized him when he sat in church on a Sunday morning. And then suddenly a smile stretched the corners of his homely, Lincoln's mouth, and he said with the delight of a schoolboy who suddenly comprehends a difficult problem:

"Miss Fanny, I see the light. It's a little light, only about an inch wide, between the bottom of a check valve, and a ⊓ pipe support that is stuck in the ground beneath it. But it's enough."

Still grinning, he reached for the telephone.

"Sylvester? Can you get me a white mouse? That's right, and get it quickly. I'll call you back, probably in half an hour."

"Mr. Abner," said Miss Fanny. "I warn you. If you bring that old rat into this office, you can get yourself a new secretary, and right quick. And you needn't come around tonight for some Huguenot torte, either."

M'Uncle Abner grinned like a mischievous schoolboy.

"It's a mouse, Miss Fanny. Only a little one. And if you get uppity about that proposal you made me earlier in the day, why I reckon I'll just have to sue you for breech of promise."

After that Miss Fanny got herself up and walked away, looking very red in the face and annoyed, and she moved her chair around so she wouldn't even have to look at M'Uncle Abner. That's the way things were when, about a half hour later, Mr. Gaskit called up to say the returns were backing up again and the meter was stopped.

M'Uncle Abner grabbed his hat, called to Miss Fanny's stiff back: "Will you please phone Mr. Piper, Ma'am, and tell him to meet me in the Investment Building basement right away?"

Then he hustled over to the dangy cellar, and sure enough the meter wasn't moving. Mr. Piper arrived right after him, carrying the mouse in a cardboard box with holes punched in it for air.

M'Uncle Abner looked around carefully, and nodded with satisfaction when he observed that everything was exactly as he had first seen the place, even to the big yellow and white cat sleeping over the return pipe. Then he took the box from Mr. Piper and stationed the steam company president right beside the meter.

"Sing out when you see it running," he said.

Next he handed the box with the mouse in it to the building engineer.

"Will you please wake up your cat, sir, and show him the mouse in this box?"

The old man hesitated and a secret concern appeared on his wrinkled face.

"This don't make no sense to me," he said. Reluctantly he took the box, and shuffled over to the cat and gave the animal a shake. A big yellow eye opened and looked at him lazily. Then Mr. Gaskit shook the box under the cat's nose. The cat inhaled one sleepy sniff, then leaped at the box in an explosion of white and yellow fur. The mouse was knocked out of the box, and the wild race was on, but nobody seemed interested but the two participants.

Sylvester Piper was shouting, "It's turning! The meter's turning!"

Mr. Gaskit said to M'Uncle Abner, "How did you know?"

"I knew," said M'Uncle Abner, "when all the material parts of the system were O.K., that we were dealing with an unseen force. By elimination, I finally concluded that the unseen force was magnetism, and that you had wound an iron core and shoved it into the cross piece of the pipe support under the check valve. Next you ran wiring under the floor to the pipe support, and so your little electromagnet held the swing disc against the seat and prevented the system from draining. Made the street steam look bad."

"But the cat?" asked Sylvester Piper. "What did the cat do?"

"The cat," M'Uncle Abner explained, "by lying on the return pipe, depressed the check valve until it touched the pipe support. Magnetic force weakens rapidly across an air gap, and every time the cat got up, the pipe would spring up and off the magnet and release the returns. You can see an inch of air space under the check valve right now. It was a wonderful way to produce erratic operation of the system, because who would suspect a cat? Or dream that the pipe support was actually an electromagnet?"

Then Mr. Gaskit, seeing his game was now up, turned to Sylvester Piper.

"I hope I didn't scare you too much with my dolls. I whittle a little, and figured maybe I could frighten you right out of the steam business and protect other engineers from losin' their jobs. It ain't easy, when your gettin' old."

M'Uncle Abner picked up his black instrument bag, bowed formally to the two men who were glaring at each other like two dogs over one bone, and took his long legs out of the basement and into the clean afternoon sunshine of the late Autumn.

The Club, Inc., Birmingham, Ala., dinner club located on top of Red Mountain overlooking the city.

Chemicals, Cooling Water Provide Comfort Conditioning

LAMAR HAMM

Manager, The Club, Inc., Birmingham, Ala.

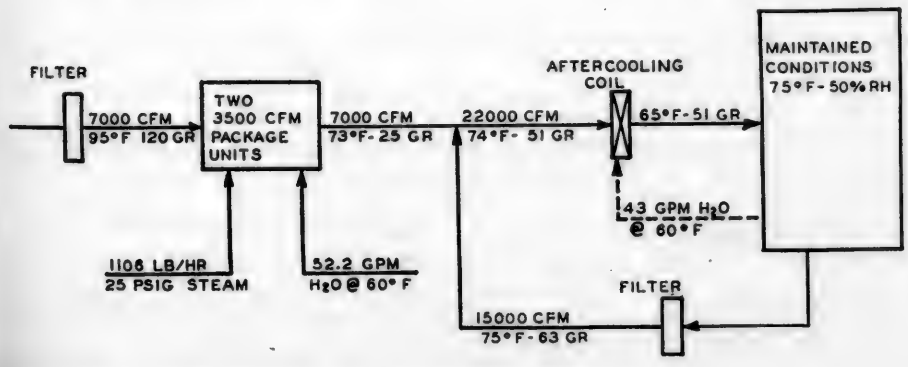
A chemical dehumidfying system plus an abundance of cooling water were teamed up for yearlong comfort conditioning of a modern dinner club in Birmingham, Ala.

THE designers of The Club, an exclusive dinner club on a mountainside overlooking the city of Birmingham, Alabama, had to meet all the normal difficulties encountered in the air conditioning of restaurants. These include:

1. Extremely variable loads, with peaks at serving hours.
2. High sensible and latent heat gains due to gas, steam, and electric appliances.
3. High concentration of food and tobacco odors requiring adequate exhaust facilities.
4. Localized high sensible and latent heat gains in dancing and floor show areas.
5. Unbalanced conditions in areas adjacent to kitchen.
6. Heavy infiltration of outside air through doors during rush hours.

The physical scope of the building added to the design problem. Patrons enter the large foyer from a circular drive and take their tables in the ball room, cocktail lounges, or bar. Off the foyer are the manager's office, checkroom, ball room, bar, and cocktail lounges at two levels. The lower level lounge has 40 feet of curved glass windows looking out over the mountain and city.

The ball room, with seating capacity of 160, has a glass dance floor with subdued lights underneath which can be raised hydraulically to the level of the



Flow diagram of Kathabar humidity conditioning system at The Club, Inc.

band stage for floor shows. There are also private dining rooms which may be combined by folding accordion partitions. Other spaces include dressing rooms at the rear of the stage, the kitchen, and rest rooms.

Equipment Application

To meet the comfort problem created by the building layout, the hot and humid Birmingham summer climate, cooking, the steady coming and going of patrons and staff, and other normal activities, the builders installed two 3500 cfm Kathabar humidity conditioners made by Surface Combustion Corporation of Toledo, Ohio. With 56 to 60 deg F cooling water from abandoned coal mines on the mountainside, a coolant was readily available for pumping to the Kathabar units and after-cooling coils. This equipment was placed in the basement with the building's furnace.

The Kathabar units take 7000 cfm of fresh air from outside the building and pass it through a flood of the lithium chloride base solution called Kathene. A property of lithium chloride is its ability to absorb water from the air; the colder the solution, the less moisture it leaves in the conditioned air.

The fresh air, which may have a maximum design temperature of 95 deg and moisture content of 120 grain per lb is cooled and dehumidified to 73 deg and 25 grain per lb (20% r.h.) in the Kathabar units as shown on flow diagram. It is then mixed with 15,000 cfm of recirculated air, passed over the after-cooling coil, and delivered to the conditioned space at 65 deg, 51 grain per lb to maintain conditions of 75 deg, and 50% r.h.

Inside the Kathabar unit, regeneration of the absorbent lithium chloride solution occurs simply and automatically. A small portion, about 10%, is constantly being pumped from a common sump to a regenerator chamber and flooded over steam coils. When the solution level rises because of dilution of the Kathene solution by the moisture absorbed, a level float opens a valve to admit steam at 25 psig to the coils. As the temperature of the solution rises it can no longer retain the moisture absorbed previously. The excess moisture is driven out of solution and is exhausted to the outside of the building by a waste air stream. Regeneration of only a portion of the Kathene solution serves to restore the absorption capacity of the entire supply.

Results

The management was able to give its patrons the finest in club appointments, services, and cuisine; it was also able to assure them of the utmost in personal comfort in a climate where summers are hot and humid.

In addition, a measure of protection against airborne infections was provided. The antiseptic properties of lithium chloride have long been known, and independent research has demonstrated that the Kathabar equipment removes 97% of airborne micro-organisms from the air passing through it. This includes pathogenic or disease-producing bacteria.

These benefits have been gained with a minimum of maintenance costs. By using the available well water to take full advantage of the dehumidification performance of the equipment, substantial capital and operating economies were provided. There are only two moving parts, the regenerator fan and the pump. Operation is automatic, with no cyclic shut-down for defrosting of coils. Periodic checks of the level and condition of the lithium chloride solution can be scheduled for hours when no patrons are present, and these checks take but little time and effort from the maintenance staff.

Railroading Problems Are Shocking

The design of refrigeration and air conditioning equipment for freight service has been one of the most difficult problems the industry has faced. This was the considered opinion of G. E. Hicke, manager of transportation equipment sales for The Trane Company, during the 47th annual convention of the National Association of Practical Refrigerating Engineers at Detroit, Mich.

In this application almost every type of imaginable problem is encountered, including extreme shock, severe vibration, equatorial-type summer temperatures, arctic-like cold air, dust storms, hurricanes, and blizzards.

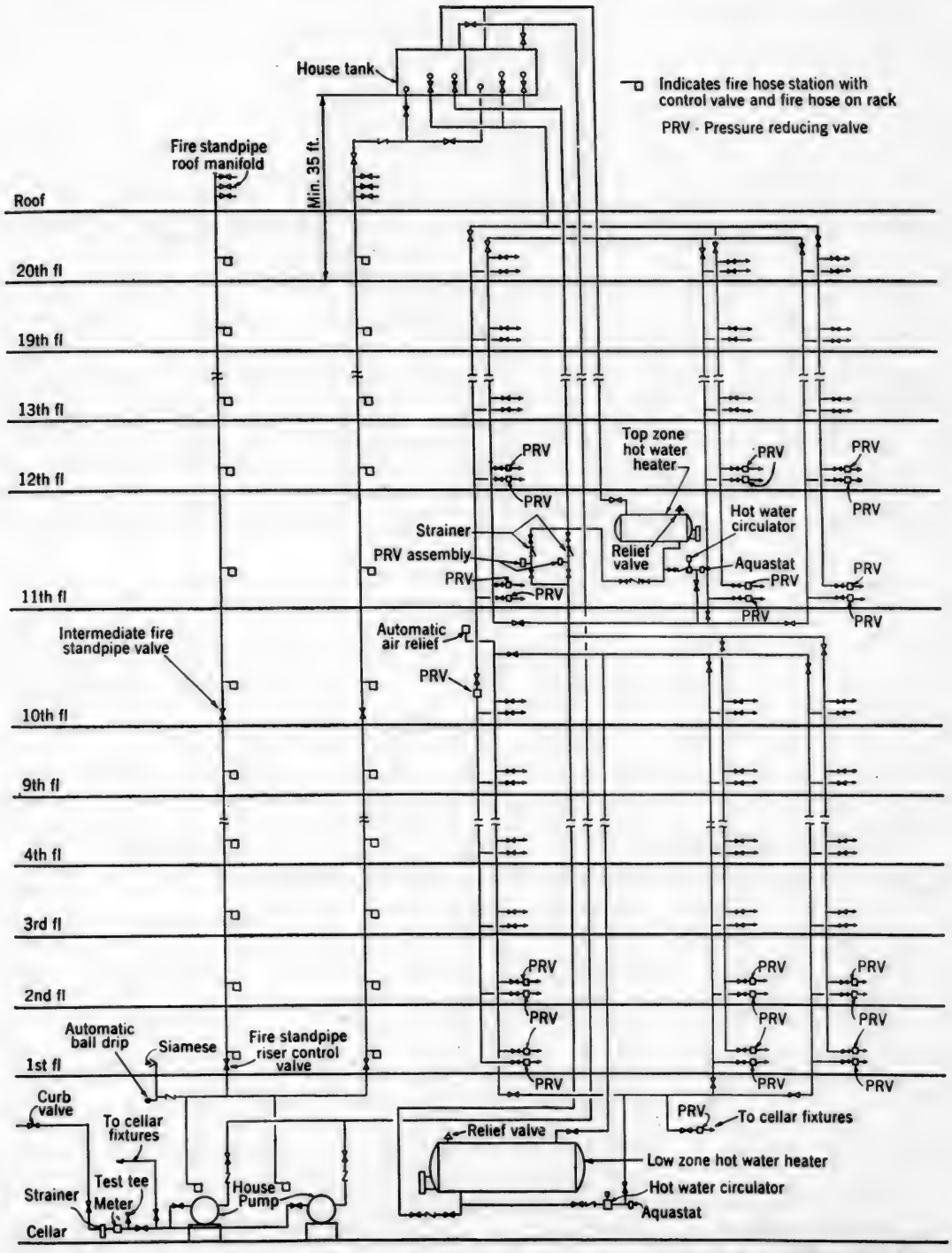
It is as fundamental to design railroad air conditioning and refrigeration equipment for efficient, quiet operation as it is for equipment used in stationary applications. The aforementioned extreme shock parallels what equipment would be subjected to in a building with a constantly shifting foundation. When switching or humping, railroad car structures become distorted and transmit a high degree of shock to the refrigeration equipment and power plant. Therefore, those who manufacture products for railway use must be more concerned about protecting the equipment from the freight car, than the freight car from the equipment. In fact, design standards closely approximate those required by the Bureau of Ships of the Navy Department.

Moving on to related equipment for railroad refrigeration systems, Mr. Hicke stated that piping connections must, of course, be tight to prevent freon and oil leakage, but they must also be mechanically strong to withstand car stress and strain. The same considerations are necessary in wiring systems.

Also noted were other railroad refrigeration problems experienced by the company since its first cooling systems went into passenger car service in 1934. These included engineering considerations for the power plant on each refrigerator car, special electrical and temperature controls required for refrigeration equipment operation, and car structure problems.

In summing up the discussion, the speaker observed that in order to provide the necessary service for railroad cooling components, it is essential to have a good working knowledge of not only the design of refrigeration equipment, but power plants, car construction, and general railroading problems, as well.

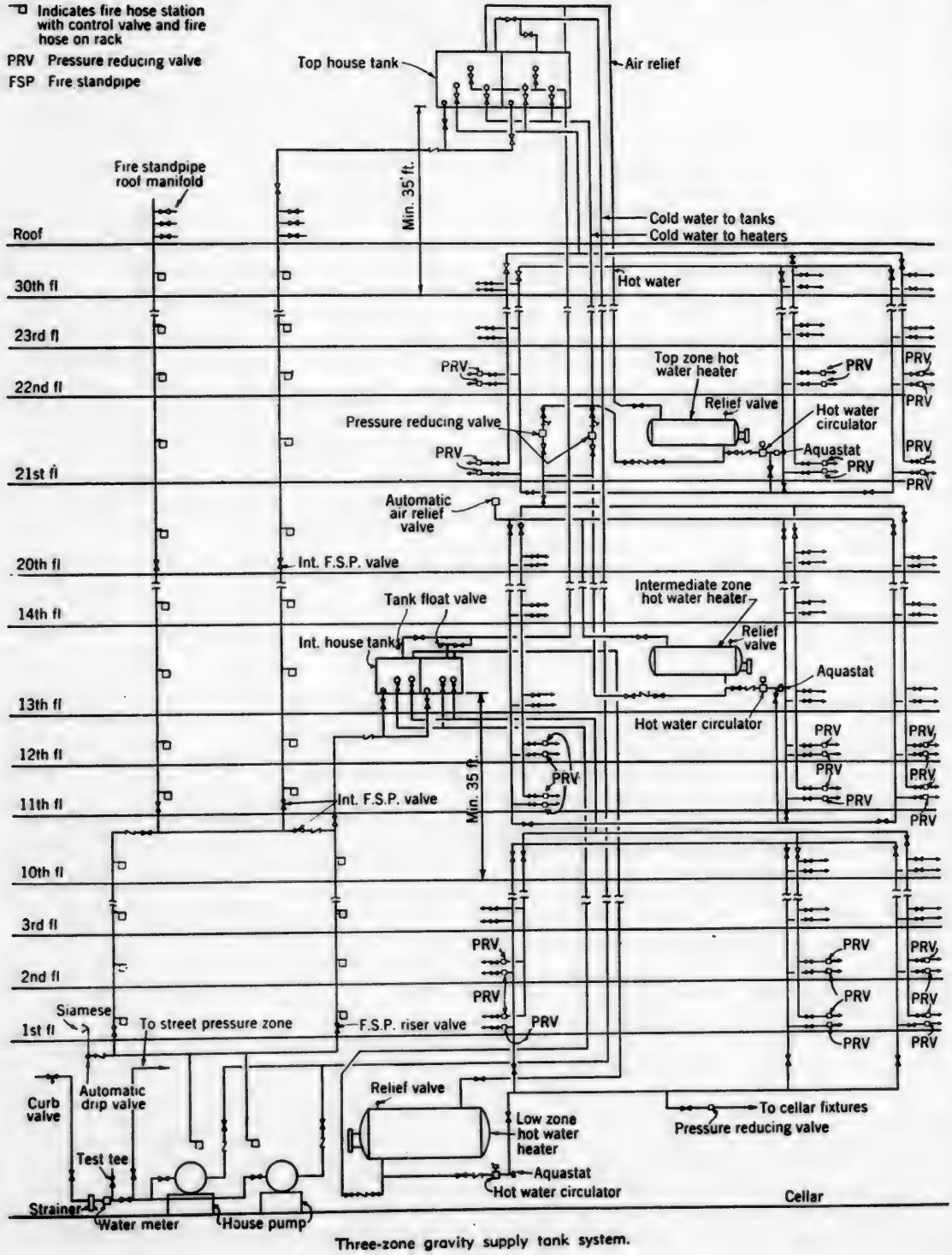
GRAVITY WATER SUPPLY TANK SYSTEM



Two-zone gravity supply tank system. The gravity supply systems illustrated provide water for fire hose stations and for building services.

Drawing Through Cooperation of James C. Church, of Syska & Hennessy, Inc., New York, N. Y.

GRAVITY WATER SUPPLY TANK SYSTEM



Three-zone gravity supply tank system.

Drawing Through Cooperation of James C. Church, of Syska & Hennessy, Inc., New York, N. Y.

AIR CONDITIONING HEATING AND VENTILATING'S

Reference Section

Design of Swimming Pools

GEORGE R. JERUS

Sanitary Engineer, Meyer, Strong & Jones, Consulting Engineers,
New York, N. Y.

Design and construction data for the various types of swimming pools. Piping diagrams are included.

AIR CONDITIONING, HEATING AND VENTILATING — FEBRUARY, 1957

Design of Swimming Pools

GEORGE R. JERUS

Sanitary Engineer, Meyer, Strong & Jones, Consulting Engineers, New York, N. Y.

Few realize the piping that is part of a swimming installation. Good design requires ample facilities for the bathers and proper provision for pool sanitation to eliminate the possible spread of skin and intestinal disorders. As a safeguard, most states require the filing of plans and specifications in advance of construction of a public pool. This article covers details on the necessary auxiliary units, and the common engineering computations.

THERE are three main classifications of pools based on the method of treatment, as follows:

1. *Fill-and-draw Type.* This is no more than a glorified bathtub which may be used for private pools having light bathing loads. However, with public pools and heavy bathing loads, water has to be changed more often due to increased pollution by the bathers. In designing a pool of this type it is necessary to provide a capacity of 500 gal of water for each bather between complete changes of pool water. In large installations, the pool size becomes enormous, large volumes of water are wasted, and the pool is out of service during long periods when it is emptied and then filled. Due to the constantly increasing pollution, it is necessary to apply chlorine directly to the water prior to each bathing period so that a satisfactory amount of residual chlorine may be in the water as a safeguard for disinfection. However, it is impossible to determine the exact amount of chlorine required and therefore over-treating of the water is necessary.

Because of these shortcomings, this type of pool would not be approved for use as a public bathing place and generally this design would be impractical for any large installations.

2. *Flow-through Type.* This pool may be employed if sufficient water for the pool can be obtained from a nearby stream. If however, a water supply system is used, the excessive waste of water must be considered. Municipalities would not permit use of city water for a flow-through pool. If water is taken from a stream, it becomes necessary to test the water for possible pollution by sewage. If pollution is present, a disinfectant may be used to curb the possible spread of water-borne diseases. In designing a pool, less than 500 gal per bather per day is too small a diluting volume without disinfection. This water pollution is reduced by disinfectants, but again it is impossible to determine the actual quantity required.

3. *Recirculation Type.* This system of purifying pool water is generally used today. This type pool has been highly developed and recirculating pumps, filters, chlorinators and incidental equipment are available from a number of manufacturers. Effective and practical control methods have been highly standardized so as to insure the maintenance of the most sanitary and attractive bathing facilities for the maximum number of bathers at a minimum of cost. In general, it is the most economical and safest mode of purification.

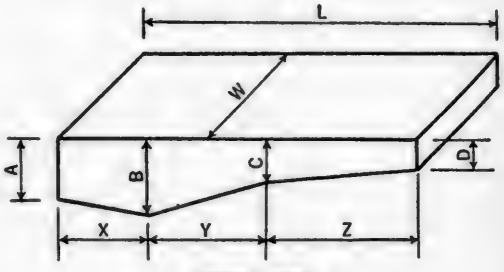
In a recirculation pool, the dirty or used water is being withdrawn continually and is replaced by filtered, purified water. In a certain sense, purification of the pool water results from consecutive dilution. The first portion of water withdrawn from the pool can be considered as all dirty water. Due to the constant admixture of entering clean water with the dirty water remaining in the pool, each succeeding portion of water withdrawn will consist of a decreasing proportion of dirty water mixed with an increasing amount of clean water.

Pool Size and General Construction

The primary step in swimming pool design is determining the general area of the pool. This is predicated on the pool use and the number of bathers in the pool at any one time.

The Joint Committee on Swimming Pools recommend a minimum length of 60 ft and widths in multiples of 5, 6, or 7 ft; pools used for athletic competition lanes should be at least 7 ft wide. However, if the pool is solely for recreation, the number of bathers using the pool is the general factor that determines the pool area. It has been found that 25 ft of water surface should be

TABLE I—DIMENSIONS FOR OFFICIAL SWIMMING POOLS



OFFICIAL POOL

Pool Capacity, Gallons	Bathing Load, Persons	Bathing Capacity Per Day*	A	B	C	D	X	Y	Z	L	W
			Feet								
55,000	48	418	8	9	5	3.25	15	20	25	60	20
80,800	75	607	8	9	5	3.25	15	20	40	75	25
120,000	108	900	8	9.5	5	3.25	18	25	47	90	30
155,600	147	1170	8	10	5	3.25	18	25	62	105	35
207,600	192	1555	8	10	5	3.25	20	30	70	120	40
254,000	243	1905	8	10	5	3.25	20	30	85	135	45
306,000	300	2300	8	10	5	3.25	20	30	100	150	50
422,400	432	3170	8	10	5	3.25	20	30	130	180	60
558,000	590	4180	8	10	5	3.25	20	30	160	210	70

* Based on 8-hour turnover.

allotted for each swimmer present at the time of maximum load. This figure, which has been adopted by and incorporated in many state codes, assumes that one-third of the people at the pool will not be in the water.

This joint committee consists of representatives of the Conference of State Sanitary Engineers, American Public Health Service, County and State Health Departments, and manufacturers of swimming pool equipment.

The depth of the pool is dependent on the use of the pool; the shallow end should have a minimum water depth of 4 to 5 ft with the bottom gradually sloping toward the deep end. At this end, it should be better than 9 ft to accommodate diving. There should be no abrupt changes in water depth where walking is possible, or approximately from the 4 ft to the 6 ft depth. With the depth and area of the pool determined, the volume of water in the pool may be determined.

For dimensions, shape and capacity of the "Official Pool" as established and recommended by the Joint Committee, see Table 1. The bathing capacity is based on a continuous 24-hour circulation and the following formulas:

$$\text{Bathing load} = \frac{L \times W}{25}$$

$$\text{Gallons required per bather} = Q = 6.25T^2$$

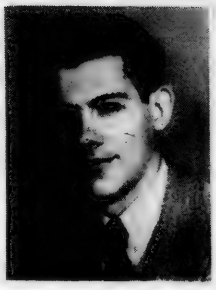
$$\text{Bathing capacity per day} = \frac{C\ V}{T\ Q}$$

Where:
- L = length of pool
- W = width of pool
- Q = gallons required per bather
- T = complete turnover period in hours
- C = hours of recirculation
- V = pool volume in gallons

As a design problem, assume that a pool will be used for general recreation and that there will be a maximum of 84 bathers. Then:

84 bathers x 25 sq ft per bather =
2100 sq ft of water surface required.

The dimensions of a pool for this capacity could be 60 ft x 35 ft or 70 ft x 30 ft, depending upon the layout or general arrangement. If the pool is used for diving, it can be assumed that the pool bottom slopes from 4 ft at the shallow end to 10 ft at a point 15 ft from the deep end. Then the average depth for a uniform slope would be $(4 + 10)/2 = 7$ ft. The area of the pool at the shallow end for a 70 ft x 30 ft pool would be $(70 - 15) \times 30$ ft or 1650 sq ft. This multiplied by the 7 ft average depth gives a volume of 11550 cu ft. At the deep end, the pool volume would be 15 ft x 30 ft x 10 ft deep or 4500 cu ft. Thus the total volume of the pool in gallons is equal to (4500 cu ft + 11550 cu ft) × 7.5 gal per cu ft = 120,375 gal.



George R. Jerus, for the past 11 years sanitary engineer for Meyer, Strong & Jones, consulting engineers, New York City, received his Bachelor of Civil Engineering degree from the Brooklyn Polytechnic Institute. He expects to receive his M.S. degree from that college's Graduate School this June. He is a member of the New York State Society of Professional Engineers and Chi Epsilon, the honorary civil engineering fraternity.

Such a pool must be lined with white or light color tiles, or glazed brick, when indoors and white cement smoothly finished, if outdoors. All corners should be rounded and the periphery of the pool should be conspicuously marked so as to show the depth of water at specific points in the pool, preferable at one foot increments. Markings of lanes, water, etc., can be of dark material but light color materials should be used for the major portion of the pool, so grime and grease on the pool tiles can be easily detected.

Recirculation System

The recirculation system consists of the piping from inlet to outlet. In between are installed a hair interceptor, pumps, heater, filters and chlorination equipment. See Fig. 1. This equipment should be so selected that water is recirculated with a minimum of frictional losses.

In determining the rate of recirculation or number of changes of pool water per day, the law of consecutive dilution has to be applied. At the end of one complete turnover, where the water is filtered and with no disinfection the water is purified 63%, after two turnovers about 86%, and after three turnovers 95%. After three turnovers, the increase in purification becomes extremely small, indicating that three turnovers will provide a suitably purified water. This conclusion is in accord with the general practice of three turnovers per day to obtain proper purification economically. Recirculation of water must continue over the whole period to obtain the results desired, depending on the efficiency of the filter. Disinfection serves as a safety factor by providing a residual

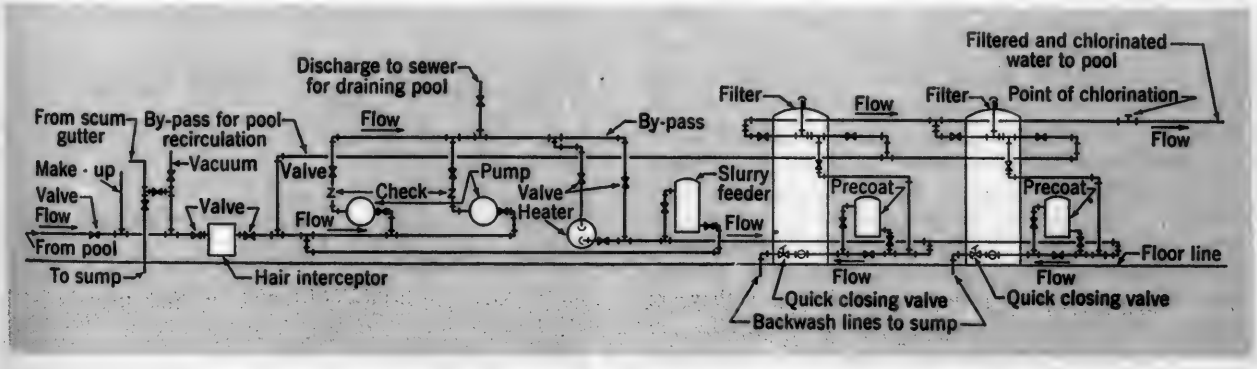


Fig. 1. Flow diagram showing the piping, valves and units of the recirculation system.

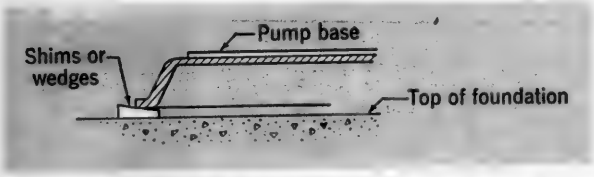


Fig. 2. Method for aligning and leveling the pump

to overcome local pollution. This will be considered as a separate topic.

Pumps

Single stage, double suction, horizontal split case, electric motor driven centrifugal pumps are most appropriate for this type of continuous running service. The pump should be bronze fitted and mounted on a concrete base, properly aligned and anchored. Figures 2 and 3 show the suggested method of anchoring and aligning the pump. Foundation bolts should be made hand tight during the shimming up of the pump, and then the base grouted in. After the grout has hardened, the foundation bolts are tightened and the alignment rechecked. If any misalignment has occurred, this is corrected by placing shims under the pumps, motor or brackets.

If the pump is located in an area where noise that is transmitted through pump vibration must be eliminated, the entire pump foundation should be set on a cork isolation pad. This concrete foundation should be constructed of such dimensions that it will weigh at least twice the weight of the pump.

These pumps should be located as close to the pool as possible and below the pool's water line. This insures the most economical piping arrangement and provides a constant submersion of the pump impellers.

Although reciprocating pumps can deliver capacities at the required head, they should not be used in this type of installation. They impart a pulsating movement to the water which is transferred to the filter bed, and this hinders the quiet required for ideal filtration.

A duplex installation with pumps in parallel is ideal for guaranteed continuous pool use and recirculation. The installation of a second or spare pump enables motor repairs or service without interruption of circulation. Also with two pumps, the entire contents of the pool can be pumped out within four hours.

The recirculating pump capacity should be sufficient to recirculate the pool water in eight hours, and to backwash one filter at a time with a flow rate from four to five times the filter rate. However, the head required for this pump is mainly dependent upon the type of filter used in conjunction with the pump. For pressure sand filters, the pressure loss is approximately 5 to 15 lb and hence low head recirculating pumps of approximately 50 ft are satisfactory. Diatomaceous earth filters, however, create pressure losses up to 35 lb, depending on the length of time the filter units are operated without the replacement of diatomite or diatomaceous earth. Therefore, the recirculating pumps used in conjunction with diatomaceous earth are generally satisfactory if they are capable of being operated against a head of 100 ft.

If the pump selected does not have a uniform capacity at a wide range of discharge pressures, a rate controller or flow regulator should be employed, especially when diatomaceous earth filters are used. This flow regulator is a valve at the vortex of a Venturi tube and is actuated by the differential pressure caused by the flow of water across the throat of the Venturi.

With the pool capacity of 120,375 gal, from the previous example, and using three turnovers in 24 hours, the rate of recirculation can be computed as follows:

120,375 gallons would have to be recirculated in an 8-hour period or

$$\frac{120{,}375}{8} \text{ equals } 15{,}047 \text{ gallons per hour or}$$

$$\frac{15{,}047}{60} \text{ equals approximately } 251 \text{ gallons per minute.}$$

Hair Interceptors

Pumps should be preceded by a hair interceptor. Its function is to remove hair, lint and other foreign matter before the flow enters the suction side of the recirculation pump. Although filters are capable of removing hair and lint, it is rather difficult to wash filters free of this foreign matter. By placing the interceptor before the pumps, long strands of hair and the lint may be removed before they can enter the impeller housing. This prevents such strands from wrapping around the impeller shafting.

An interceptor consists of a removable basket type screen so arranged that the water passes through the strainer from the inside. The strainer should be noncorrosive with holes no more than $\frac{1}{8}$ in. diameter with the combined area of these holes equal to about ten times the area of the inlet piping. By providing this area, friction loss is reduced and there are longer periods of operation before cleaning is necessary. Valves should be placed to prevent water flow through the screen during the cleaning operation. It should be possible to remove the screen quickly which means that the housing should have a minimum of wing nuts on the cover or be of the yoke type. Some manufacturers make a duplex strainer which enables the cleaning to be done without interrupting the recirculation. The duplex strainer has an integral valve which diverts the water through one strainer while the other is being cleaned.

Vaccum Cleaning

Vacuum cleaning is not required by local ordinances but it is generally recommended and therefore installed. Inlets for such cleaning may be connected to the suction

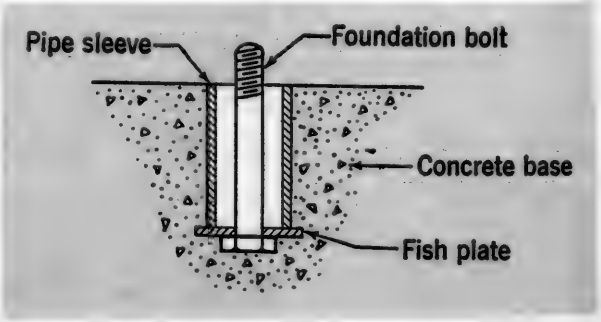


Fig. 3. Suggested method for anchoring foundation bolts.

side of the recirculating pump or to a pump installed solely for this purpose. By locating the inlets properly, Fig. 4, complete coverage of the pool bottom may be obtained to remove sediment and algae efficiently. There should be approximately one vacuum outlet for every 40 ft of pool perimeter. If the circulating pumps are to be used for suction cleaning, they should have a good suction lift and an open type impeller.

The type cleaning unit selected is predicated on the size of the pool. The pool bottom of large pools, may be cleaned by either the tow type unit or a man fitted with a diving helmet and the standard attachments. In a small pool all the cleaning may be done from the walkway with extension handles attached to the cleaning unit.

Make-Up Water

The quantity of water necessary for make-up is dependent upon the number of bathers and evaporation, when considering a recirculated system. The most significant loss is caused by the bathers displacing the water over the scum gutter line. If it is assumed that the average weight per bather is 150 lb, then the loss of water can readily be computed as follows: If there are 84 bathers during the maximum hour, then

$$\frac{84 \text{ bathers}}{\text{hour}} \times \frac{150 \text{ lb}}{\text{bathers}} \times \frac{1 \text{ gallon}}{8.3 \text{ lb}} \times \frac{1 \text{ hour}}{60 \text{ min.}} = 25.2 \text{ gal}$$

lost per minute. This should be the minimum amount of water provided for make-up and it determines the size of the water supply needed for the pool. However, if the length of time allowed for filling the entire pool is any criterion, the flow rate should be corrected accordingly.

Preventing Back Flow

When introducing a potable water supply to the pool, direct connections or cross connections should be avoided. This prevents pool water from being siphoned back into the potable supply when a large pressure drop occurs in the city mains. To avoid these cross connections, a positive break in the systems must be created; this is accomplished by above-the-rim filling, the use of a suction tank, or the so-called "swing joint" connection.

Over-the-rim Supply. In over-the-rim filling, a manually operated system, water may be either admitted through a pipe extending under the diving board, through an ornamental center fountain or a wall mounted ornament above the floor of the pool area which is considered to be the overflow level of the pool. Although this method seems to be the most economical means of introducing water, it has definite disadvantages. The primary drawback is that untreated water which enters the pool would require eight hours, a complete recirculation cycle, before it is treated. If any appreciable amount of unheated pool water has to be made up, it is impossible to maintain a uniform pool temperature. The discomfort created by the unheated water may be overcome by placing a heater in the make-up line, which would have to be manually operated.

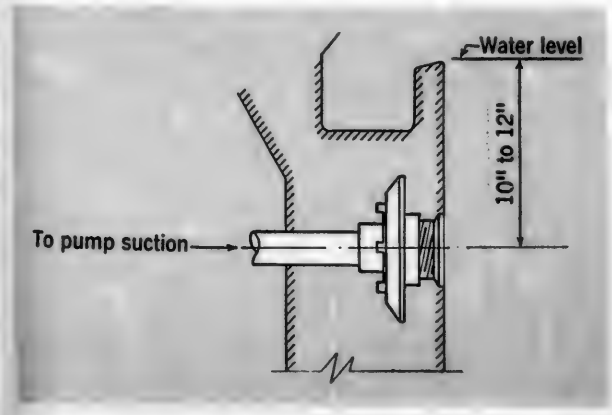


Fig. 4. Location of water inlet for complete pool coverage.

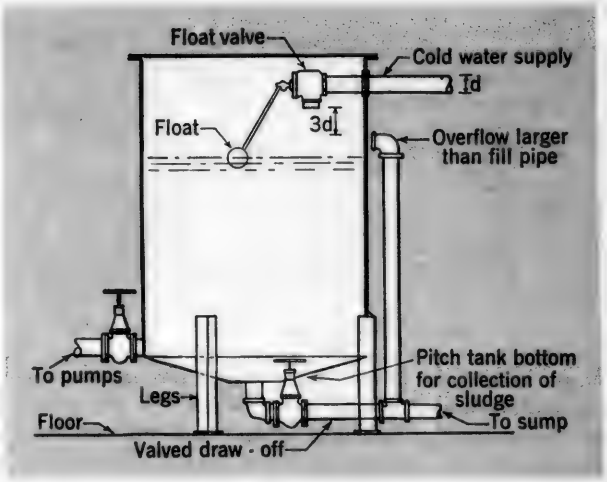


Fig. 5. Typical suction tank and float installation.

Suction Tanks. The suction tank mode of admitting water may be divided into two classes—(1) where the tank is located above the rim of the pool and (2) where it is located below the rim of the pool. These tanks are generally constructed of Class A steel, of welded construction, and are given shop and field coats of a bitumastic as a protection against rapid corrosion.

The tank placed above the pool rim may be small because size depends solely on the make-up rate. Water from this tank may be either manually or automatically supplied to the pool. For automatic make-up, an open standpipe may be set alongside the pool with a float switch in the standpipe at the level of water required in the pool. This float switch actuates a solenoid valve in the make-up line from the tank to the recirculation system, on the suction side of the pumps. By admitting the make-up water on the pump suction side, the water is purified, disinfected and heated before entering the pool. A definite advantage of this system is that the suction tank keeps the pump impellers flooded at all times.

If the tank is located below the pool rim, the make-up water from the suction tank would be manually operated. The make-up line, in this case, would have to supply water at the same rate as the pump. Therefore, the line would have to be larger. This tank should contain at least a two-minute supply at the pump rate to permit the operator to shut the tank valve when the low alarm rings. This minimizes the danger of having the pump impeller rotate in air, a danger that arises because the pool recirculation line has to be closed before the make-up line is opened. If this were not done, the pool water would

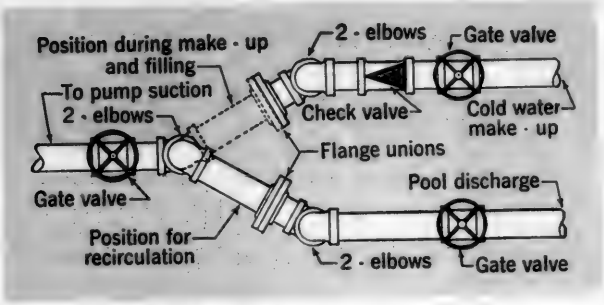


Fig. 6. Swing joint connection.

surge through the piping and overflow through the suction tank because it is below the pool level. A check valve placed in the line from the suction tank will minimize this possibility. Figure 5 shows a typical suction tank installation with the required float valve. A suction tank for a regular pool should have a capacity of at least 500 gal (2 times 250) and with one foot allowed for the float valve above the top of the water level. According to Table 2, a tank of this capacity would be 4.5 ft in diameter and 5.5 ft high. The tank should be furnished with a draw-off and overflow connection.

Swing Joint. Some communities permit the use of a swing joint connection, provided that a check valve is installed on the pipe leading from the potable water supply. The swing joint should be installed so that the movable section may be connected either to the fresh water pipe or to the recirculating pipe, with the direction of flow toward the pivot point. Figure 6 shows a typical swing joint connection that can be connected in any part of the system, but it requires the constant assembling and dissembling of the swing joint.

Filtration

Filters are used to remove turbidity as well as microorganisms and some bacteria. There are two major types of filters in vogue today that do this. They are diatomite and pressure sand filters. Most installations up to World War II had used sand filters but gradually the diatomite filter is replacing sand.

Sand Filters

The filtering medium consists of suitable grades of screened filter sand or crushed quartz and gravel to a depth of at least 36 in. Satisfactory results are obtained when the effective size of the sand is about 0.4 mm with a uniformity coefficient not greater than 1.75. Sand should be washed free of clay, organic matter, and soluble material. A free board of approximately 18 in. should be provided above the surface of the sand bed. This freeboard permits the backwashing to be done without the excessive loss of the filtering medium. These filters may be either vertical or horizontal, but in any case the flow is down through the filter for normal operation and reversed for backwashing. Without a coagulant, the sand filtering medium would only be effective in removing coarse solids from the recirculated water, but by adding a coagulant, the sand becomes a very effective medium capable of removing suspended solids and bacteria which is the criterion of a good filter.

Alum (Aluminum Sulphate), the usual coagulant, is injected into the pool water ahead of the filter to coagulate finely divided matter into larger particles which are readily removed by the filters. The coagulant, when added to the water, reacts with the alkalinity present, to form an insoluble, jelly-like precipitate called the floc. The floc attracts and enmeshes the finely divided material including organic matter, color compounds and bacteria. The filter sieve of sand removes this floc so that the water leaving the filter is clear and clean.

A certain time interval is required to allow the chemical to react, otherwise the floc may form in the pool and cause turbidity. Therefore, this alum may be introduced into the surge tank so that there will be the time necessary for flocculation.

Alum lowers the pool pH, because it is an acidic compound and reacts with the alkaline compounds in the pool water. This pH index used for measuring the acidity of pool water, should stay between 7.0 and 7.6 to prevent smarting of eyes and irritation of the mucous membranes. Alkali must be added in this type of installation to maintain the necessary pH. This may be accomplished by injecting soda ash solution to the filter influent line or to the pump suction by means of chemical feeders or solution pots, or briquettes of soda ash may be placed directly in the pool water.

The acidity incidental to the use of alum may be neutralized by using calcite rather than sand as the filtering medium. The calcite gradually dissolves as it neutralizes the alum acidity and hence fresh granular material must be added from time to time. The flow rate through a sand filter should be not more than 2 gpm per square foot of filter area.

Diatomaceous Earth Filters

During World War II, the need for compact water clarification equipment resulted in a diatomite type filter which later came into use as swimming pool filters. The filtering media consists of a diatomaceous earth, which is the powdered fossil remains of shell-like microscopic marine plants. Because of the microscopic particles, irregular shapes and chemical inertness, diatomaceous earth has proved to be an ideal filtering medium. The diatomite filter consists of numerous cylinders suspended vertically from a sectional head. These cylinders are constructed of monel, aluminum oxide or other

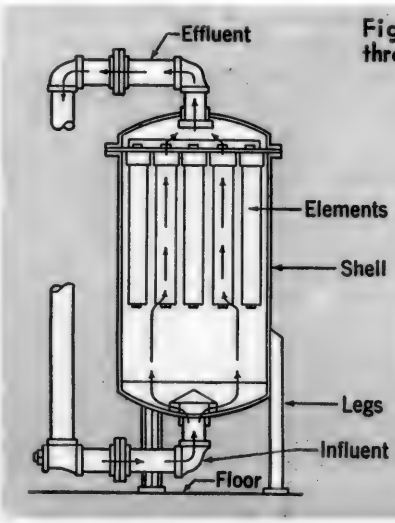


Fig. 7. Section through a diatomite filter.

inert materials which are woven in a tight mesh screen on which the filter coat of diatomaceous earth is retained. A typical section through a filter is shown in Fig. 7. These elements are coated by use of a precoat pot containing the diatomaceous earth. The recirculated water picks up the earth and deposits it on the filter element. The diatomites are so minute in size that they filter out micro-organisms and bacteria without the introduction of any coagulants or alkalis.

The length of filter run can be increased by adding a slurry feed which is the constant addition of diatomaceous earth. The slurry continues to build up the filter cake on the element but prevents rapid clogging and/or fouling, and therefore permits a greater amount of solids and other impurities to be removed.

The flow rate through the diatomaceous earth filter is from 2 to 4 gpm which is approximately twice the rate permitted through a sand filter. Flow through these filters is upward causing the water pressure to hold the cake on the cylindrical mesh screens of the filter elements. When the flow is stopped, the major portion of the filter cake drops off. This causes no problem when a pool is on a continuous 24-hour running cycle but if it has to be shut down periodically, a bypass or a smaller pump can be installed in the system to maintain a constant flow through the filter and thus hold the filter cake in place.

Backwashing of this type filter requires no additional water, only additional pressure to remove the particles remaining in the element screen. This additional pressure is obtained by installing a quick-closing valve on the backwash line and utilizing the water hammer caused by opening and closing this valve. During backwashing, the filtering media is washed from the element and has to be replaced. The backwash should discharge into an open sump from which it is pumped or discharged by gravity to an open sewer.

If the backwash water is allowed to stand in the sump, the diatomaceous earth will settle out and to be reclaimed and reused in a slurry feed. By doing this, however, the length of the filter cycle is reduced, so reclaiming is only practical to a point where additional costs for backwash are not excessively increased. Only the pool operator can determine this point of diminishing returns.

The diatomaceous earth filters appear to have definite advantages for use at swimming pools. They require a smaller floor area because of the higher rate of filtration permitted and the fact that the area of the filter is the

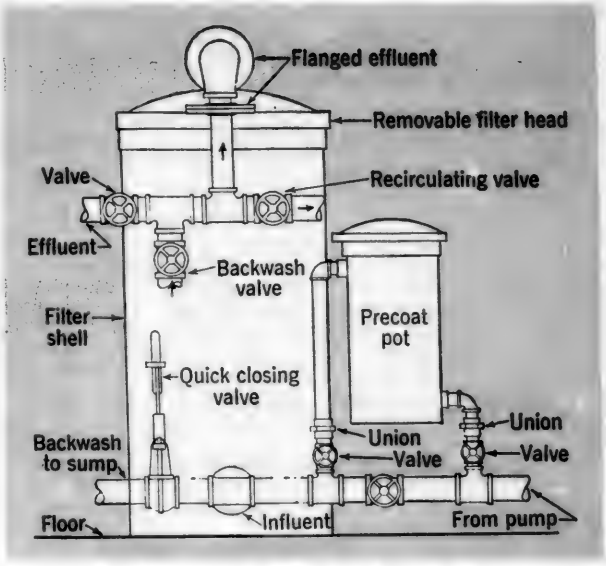


Fig. 8. Hookup for filter and precoat unit.

surface area of the elements which are vertical; sand filters require a floor area equal to the area determined by the lower flow rate. In addition, the elimination of coagulants and alkalis in a diatomite system reduce the need of handling extra chemicals and equipment which in turn reduces the problem of maintenance. Efficiencies of both the sand and diatomaceous earth are approximately the same but the initial investment for the diatomaceous earth is approximately 1⅓ the cost of pressure sand filters of equal capacity. However, in construction costs, operating and maintenance costs, the savings on the sand filters would soon be lost.

The shell, housing the elements, should be of class *A* steel suitable for a 150 psi water working pressure and tested for 225 psi. This pressure is required because of the back-pressure created in backwashing the unit. The inside of the shell should be coated with a polyvinyl plastic to prevent corrosion and abrasion of the shell. If there is a possibility of an electrolytic action, the shell should be grounded and a magnesium anode rod installed in place of one of the elements. This rod should be checked periodically as the electrolytic action will corrode the element instead of the steel shell. It should be replaced, when necessary, to prolong the shell life.

Using the typical pool previously cited which had a flow rate of 250 gpm, the filter area required would be:

$$\frac{250 \text{ gpm}}{2 \text{ gpm per sq ft}} = 125 \text{ square feet required.}$$

The 2 gpm per sq ft is used because flow at this rate will lengthen the filtration cycle from three to four times that of a flow rate of 4 gpm per sq ft. It is also more economical. If units are to be in duplex, then each filter has a filter area of 62.5 sq ft. By referring to the manufacturers' catalogs, it is found that the floor area required is approximately 4.5 ft by 12.5 ft with each filter shell 26 in. in diameter, 5.25 ft high, containing about 11 elements. The remainder of the space is for the piping and precoat pot. (Figures 8 and 9)

If units are in triplex, then each filter has a filter area of 42 sq ft which would require a floor area of 3.5 ft x

TABLE 2—CAPACITY OF SUCTION TANKS

Tank Depth, Inches*	Tank Diameter, Inches							
	24	30	36	42	48	54	60	72
	Gallons							
30	59	92	132	180	235	298	368	528
36	71	110	158	216	282	358	441	632
42	82	129	185	252	330	417	514	740
48	94	147	211	288	376	477	588	844
60	118	184	264	360	470	595	735	1056
72	141	221	317	432	565	715	882	1268
96	188	294	423	576	753	954	1175	1692
120	235	368	528	720	940	1190	1470	2112

*Add 12 in. for float.

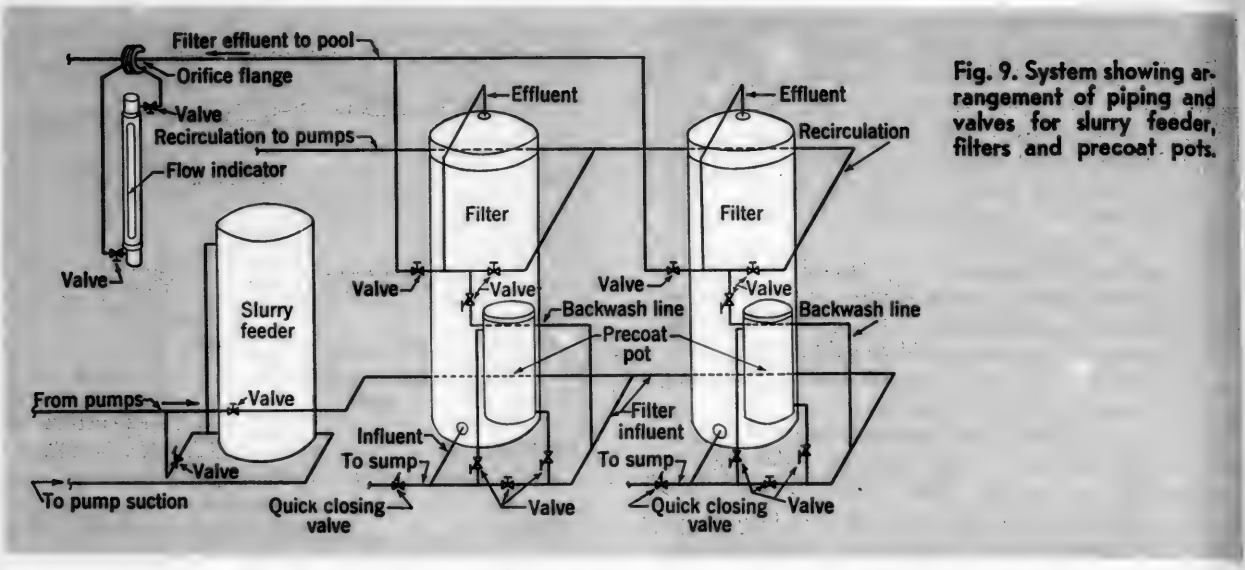


Fig. 9. System showing arrangement of piping and valves for slurry feeder, filters and precoat pots.

14.5 ft with each filter shell 18 in. in diameter and 5 ft high, having about 7 filter elements. With these figures for space and size of equipment, the only means for deciding which to select is engineering economics. Only the designer or owner can determine this depending upon the location of the pool.

Pool Inlets

The purpose of the pool inlet is to distribute water to maintain a chlorine residual throughout the pool body. These inlets should be 20 to 30 ft apart and located around all four sides of the pool, see Fig. 10. Care should be taken in locating these inlets that "dead areas" are not created in the corners of the pool. Inlets may be located near the corners of the pool in such a manner that the stream flow would be tangential to each adjacent side wall giving a spiral circulation to the entering water which aids in rapid mixing.

Another method of securing effective distribution of the recirculated water is by using the outlet drain as the inlet, and the scum gutter drains as the outlets. The result is a radial upward flow from the deep end to the scum gutters, facilitating rapid removal of floating matter. Theoretically, this second method is correct but it creates great difficulties in planning. In this system, it is necessary to use additional overflows above the scum gutter line, which would enable the overflow water, during peak bathing loads, to flow to the sewer. However, when the bathing load subsides, the pool water level would drop and if it goes below the scum gutter line, the circulation of the pool water ceases.

Flow from each inlet should be determined by the amount of water needed for recirculation in any area. For example, if a pool is used solely for diving or practice swimming, the amount through each inlet is the same. If the pool is partially used for diving while the other portion is used for practice swimmers, it is easy to see that more bathers would be at the practice end and this will cause water to become polluted more rapidly. Therefore, the water should be changed more rapidly. This requires more water to flow through inlets in this portion of the pool. In general, the free area on the inlet plate should be at least the same as the area of the pipe supplying the inlet. Valves should be placed on each inlet to secure the desired flow in each section of the pool. This may also be accomplished by an adjustable inlet in lieu of the valve.

The piping, supplying a series of inlets, may be sized on the equalization of pipe capacities at a loss of 50 ft per 1000 ft of pipe, because distances between the inlets are relatively short and friction losses will balance. Each inlet will, as generally assumed, provide a flow of 15 gpm; therefore, for the typical pool which has a flow of 250 gpm, approximately 17 outlets would be required. The piping between inlets shall be sized in accordance with the pipe capacities listed in Table 3.

Any of the pipe materials shown in Table 3 can be used for the piping between the inlets. However, the least desired is galvanized iron. Within a relatively short period of time, galvanized iron pipe rusts and, in so doing, it is likely that rust stains will appear at the inlets and the pool would require more frequent cleaning.

Inlet piping, when it is run below ground and in contact with the earth, should be coated heavily with asphaltum. The initial cost of this painting would be very small compared with the cost of digging up and replacing the old lines.

Outlets

The pool should be provided with an outlet of sufficient

TABLE 3—RELATIVE PIPE CAPACITY FOR INLETS*

Pipe Size, In. Dia.	Galv. C = 100	Brass C = 130	B Tube	K Tube
1¼	13	16	21	12
1½	19	24	33	19
2	35	48	59	42
2½	61	81	103	75
3	100	136	173	121
4	220	278	338	258
5	400	520	588	460
6	625	870	935	720

* Based on Hazen and Williams formula of 50 ft loss of head per 1000 ft of pipe.

size, at the deepest point, to permit continuous circulation and draining of the pool in a relatively short length of time—from 4 to 8 hours. Suction currents and friction losses should be reduced by increasing the grating area of the outlet to at least 4 times that of the discharge pipe. The grating should be fastened in such a manner as to prevent its removal by the bathers, and be of such dimensions that the body of a bather cannot cover it entirely.

Table 4 shows the relative carrying capacity of the different size outlet pipes. This table is based on an average of conditions as the actual flow will vary depending on the depth of pool and types of gratings covering the outlet.

Scum Gutters

The best practice is to provide scum gutters as illustrated in Figs. 11 and 12. However, most codes do not require their installation. The gutters should extend completely around the pool and be of such shape and size that bathers' feet and arms cannot be caught in them when being used as hand holds. The gutter should also be capable of retaining the floating matter that has entered and should not permit this flow back into the pool following a sudden surge of entering water.

Scum gutter drains are spaced 10 to 15 ft apart in the gutter, extending around the periphery of the pool. The gutter should be pitched to these drains. Overflow pool water, which contains floating matter and body grease, is directed through these drains to the waste piping system. While the waste piping is generally connected to the sewer, when the pool make-up water has to be softened before entering the suction tank, it may prove more economical to recirculate the waste water. By valving the scum gutter line properly, either of these methods may be employed, but no direct connection to the sewer should then be made. Piping for these outlets may be galvanized or cast iron and piping to each drain should be at least 2 in. in diameter.

Disinfection

It is not only necessary to treat the pool influent the same as a potable water supply, but it is also necessary that a residual be kept in the pool body to combat contamination by the individual bathers. To maintain a residual, either chlorine or bromine would be the preferable disinfectant. Ultra-violet lights may be used if installed properly or ozone may be injected into the water. Neither method imparts any residual in the pool body.

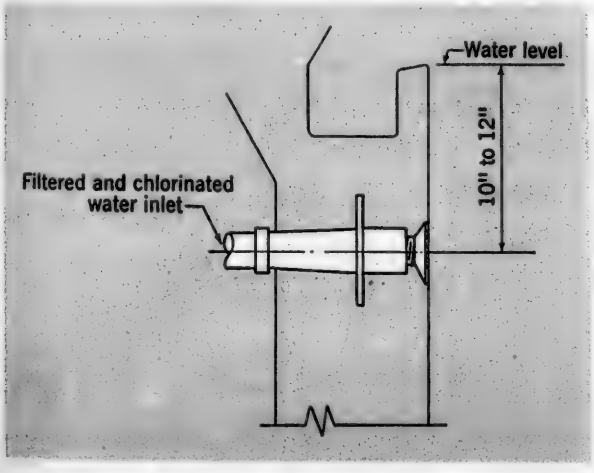


Fig. 10. Suction cleaning connection.

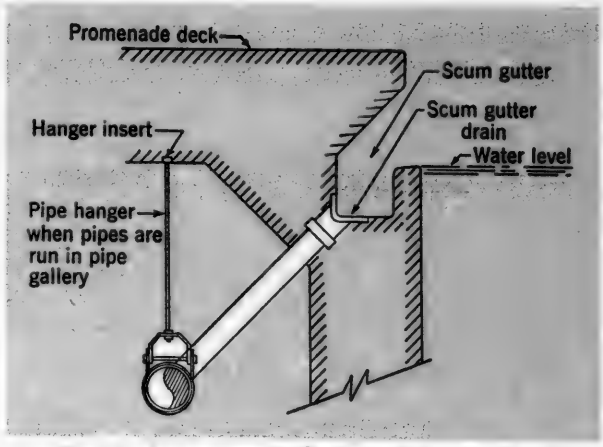


Fig. 11. Arrangement of a typical scum gutter.

TABLE 4—OUTLET PIPE CAPACITIES

Pipe Size Inches*	Gallons per Minute
4	150
5	260
6	420
8	900
10	1590
12	2500

* Based on Hazen and Williams formula with C = 100, and loss of 25 ft head per 1000 ft of pipe.

Chlorination. Chlorine has proven the most satisfactory disinfectant for pool water; it has qualities for the ideal disinfectant. Chlorine attacks and kills bacteria contained in the pool water and is capable of providing the necessary residual to combat bacteria carried into the pool by individual bathers. This residual should be from 0.3 to 0.5 ppm, although the quantity should not be exceeded. Any excess residual chlorine increases an acidic quality to the water, thus lowering the pH, which in turn causes irritation to the mucous membranes unless the pH is controlled.

The amount of chlorine necessary to maintain the required chlorine residual is dependent upon the chlorine demand of the make-up water and the water in the pool, in addition to the location of the pool (whether indoors or outdoors). At peak bathing loads, the dosage will be well above the demand required for the average load because the amount of bacteria and organic matter introduced into the pool has increased.

When a pool is outdoors, experience has shown that strong sunlight leads to a rapid dissipation of residual chlorine so that a large capacity chlorinator is needed. Generally, the chlorinators should have a capacity for a maximum dose of 2 ppm for indoor pools and 4 ppm for outdoor pools.

Chlorination is usually obtained through the use of gaseous chlorine or hypochlorites. Although direct application of the gas or hypochlorite will produce the necessary disinfection, the preferable method is to dis-

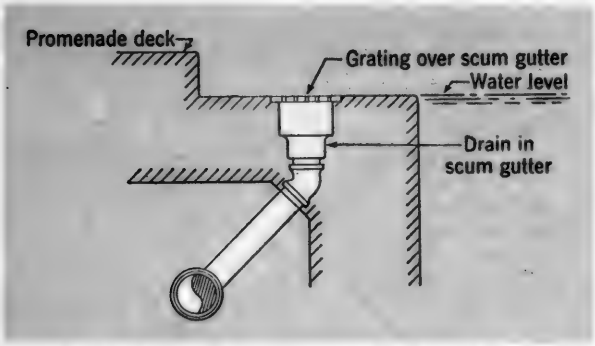


Fig. 12. Another arrangement for a scum gutter.

solve the chlorine in a small flow of water, and introduce the concentrated solution into the pool influent. This permits the chlorine to diffuse evenly through the pool through the water inlets. Piping used for chlorine solutions can be a rubber hose, properly supported, or a plasticized rigid polyvinyl chloride pipe. Because chlorine has been the acceptable and proven disinfectant, manufacturers have made automatic methods of introducing the required dosage so as to maintain the proper residual.

Hypochlorinators. Hypochlorinators, generally small diaphragm or piston type pumps, are easy to maintain and simple to adjust. The amount of solution can be regulated by the displacement of the diaphragm or piston and, therefore, accurate dosages can be injected into the pool. Hypochlorite solution can be used economically on pools that require about one pound of chlorine per day. Although hypochlorinators can be used for larger capacities, it is generally recommended that gas chlorinators be employed.

Most solutions used for these installations are approximately 1% and, therefore, it is easy to increase the percentage and thus better the dosage. These units can be located anywhere in relation to the equipment but caution should be used as to horizontal distance for excessive friction losses may develop.

Liquid Chlorine. When chlorine gas is compressed in heavy iron cylinders, it becomes liquid; upon release of pressure, it again becomes a gas. Pools requiring more than the one pound of chlorine per day generally find that these cylinders are the more economical way to provide chlorine. However, although there is no danger from the hypochlorites, chlorine in the gaseous state creates some hazards that cannot be overlooked.

When using the chlorine cylinders, it is necessary, by State laws, to provide a separate gas tight room for the chlorine equipment. This room must be adequately ventilated to remove the chlorine gas in case a cylinder breaks or explodes. Gas masks should also be provided at a point outside this room, in addition to explosion proof light switches and lights in the room proper, so as to reduce the hazard. Because chlorine gas is very soluble in water, an emergency shower placed over the cylinders is often recommended. This shower would have an operating valve located outside of the room and, in the event of the escape of chlorine gas, the room can be flooded with water which will absorb the free chlorine gas and carry it to the sewers.

Chlorine-Ammonia. Due to operating conditions, the use of chlorine alone may not be sufficient to maintain satisfactory residuals in the pool. For instance, a rapidly fluctuating bathing load makes it difficult to retain a proper residual. An excess chlorine residual beyond 0.6 ppm becomes irritating to the eyes. It is possible that the same 0.6 ppm may be wiped out rapidly by a sudden influx of bathers. To stabilize the residual under the varying types of bathing loads, the addition of ammonia prior to the addition of chlorine may be desirable. The ammonia-chlorine ions combine forming a chloramine ion which is an effective germicide of more stability. The ammonia is fed and tested in the same manner as chlorine but care must be taken in testing for the residual. Excess ammonia can be oxidized by biological activities to nitrates, which seriously affects the accuracy of the orthotolidene test.

Chlorine and chloramines also decompose algae, thus reducing the number of times it is necessary to clean the pool bottom because of algae growth. Now let us determine the amount of chlorine that will be required for the typical pool which contains 120,375 gal of water and is recirculated three times in 24 hours. The total weight of water circulated in a day is:

$$\frac{120{,}375 \text{ gallons}}{\text{turnover}} \times \frac{3 \text{ turnovers}}{\text{day}} \times \frac{8.3 \text{ lb}}{\text{gal}} = 2{,}997{,}338 \text{ lb}$$

If we require a residual of 0.3 to 0.5 ppm (use 0.4) then:

$$\frac{2{,}997{,}338 \text{ lb water}}{\text{day}} \times \frac{0.4 \text{ lb chlorine}}{\text{million lb water}} =$$

1.20 lb chlorine per day

Tests

The pool water should be tested periodically for residual chlorine by the orthotolidine test for chlorine and a comparator which has a set of standards for various chlorine residuals. See Fig. 13.

The test used to measure the residual of chlorine, chloramine, and bromine is a standard colorimetric test using orthotolidene. Allowances must be made for nitrates and also the combined elements which may be present in the pool water.

Other Methods of Disinfection

The following methods of disinfection are generally

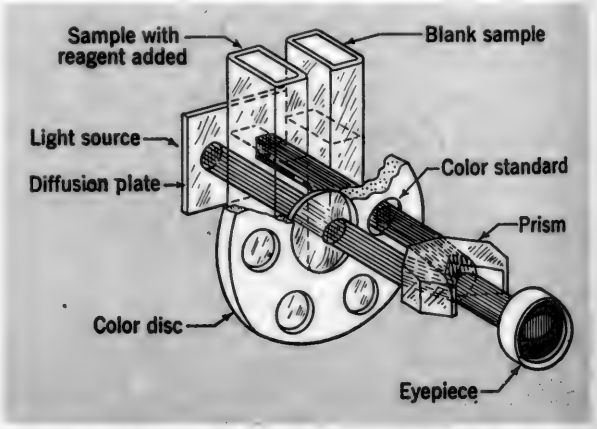


Fig. 13. Apparatus for determining residual chlorine.

accepted, but present problems in handling and/or providing a residual.

Bromine. This substance has been successfully utilized as a disinfectant and has the same disinfecting qualities as chlorine, but it takes about twice as much material by weight to produce the same residuals. Bromine, although a liquid, is highly corrosive and gives off heavy fumes which make it difficult to handle. It is fed into the pool by bubbling through water and by injecting the solution into the pool recirculation lines. Due to the fact that bromine is not used in many pools, manufacturers of disinfecting equipment have not produced any automatic units. This necessitates the use of make-shift apparatus to create the bromine solution needed for injection into the pool recirculation line.

Ozone. To be effective, ozone must be properly applied and must be used in sufficient quantities to accomplish the complete purification of the water. A molecule of ozone is composed of three atoms of oxygen instead of two, which causes it to be very unstable. The molecule tends to stabilize by allowing the third oxygen atom to oxidize the bacteria.

By subjecting the oxygen in the atmosphere to electric discharges in a specially constructed generator, the unstable ozone is produced. The atmosphere must first be freed of water vapor because the vapor will react with the nitrogen producing an acid during the electric discharge. The ozone is then put into solution and injected into the pool.

Ozone is an effective germicide but because of its high instability, it is practically impossible to impart a constant residual, if any, in the pool. There is no obnoxious odor from ozone and irritation is reduced to a minimum.

Ultra-Violet. The use of ultra-violet irradiation as a disinfectant requires the construction of a chamber through which the filtered water enters the pool. This chamber is lined with ultra-violet lights which furnish the necessary light rays for disinfection. The disinfecting qualities of these rays do not impart any residual to the water, thus the effectiveness is limited to the light chamber. If the water is turbid, the intensity of the ultra-violet rays is diminished, causing a reduction in its disinfecting qualities. The lights are expensive and require considerable maintenance without giving any residual to

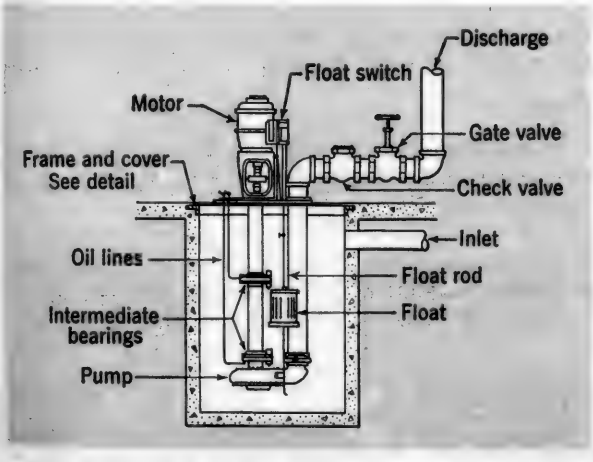


Fig. 14. Installation of pump and float control.

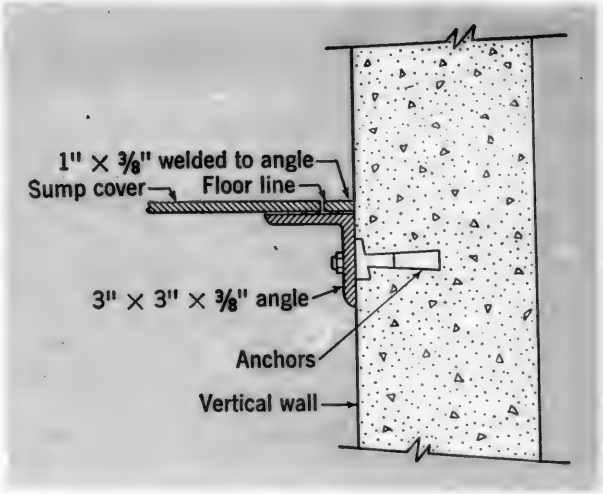


Fig. 15. Method of installing sump frame and cover.

the water as a dividend for the additional work and money invested.

Pool Water Heating

In general, the fresh water introduced into a pool is below the desired minimum temperature and has to be heated. Pool water temperature should be kept in a range from 68 to 78 deg. The tendency in modern pools is to maintain temperatures between 76 to 78 deg as the lower temperatures are attractive to only vigorous swimmers. These temperatures are obtained through the use of a heater so located or piped that heated water is not wasted during backwashing.

Heaters should be the instantaneous hot water heater type, capable of raising the water temperature from 40 to 80 deg. If the length of time for the initial heating is of no significant importance, the heater would only have to be capable of heating the make-up water and counteract heat losses due to evaporation. However, since the quantity of make-up is so slight, general practice is to size the heater with the heating capacity per hour equal to ten times the gallon per minute rating of the pump. This provides for adequate heating after the initial heating of the pool which would take approximately 48 hours. The pressure drop through the heater should not be greater than 4 ft.

The necessary aquastats and thermostatic valves should be provided to furnish an automatic operation keeping the water temperature relatively constant. A bypass around the heater insures continuous operation during repairs.

When an indoor pool is operated during the colder period of the year, it should be adequately ventilated to avoid excessive humidity, but at the same time, the air should be at approximately the same temperature as the pool water to prevent chilling of the bathers leaving the pool. General practice is to maintain air temperatures about 5 deg higher than the water. If the pool is outdoors and/or in a warm climate, it may become necessary to cool the water. Water above 78 deg becomes tepid and leads to bathers' discomfort, increased growth of bacteria and algae, along with creating difficulties in maintaining a proper chlorine residual. The water may be cooled by the addition of cold water make-up, by the use of heat

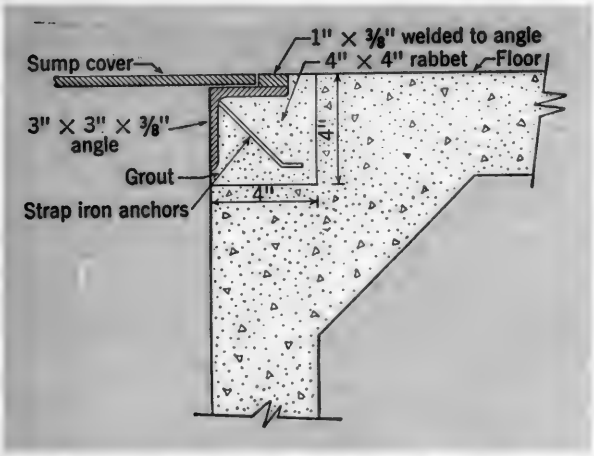


Fig. 16. Another arrangement of sump frame and cover.

exchangers, cooling towers or spray inlets, or providing artificial shade. The heat exchanger can be installed if there is a supply of cold water available which cannot be used as a pool supply because of unsatisfactory physical or chemical qualities. The spray inlets or cooling tower can be used regardless of water make-up. It reduces the temperature of the water by evaporative cooling. The efficiency of the cooling tower can be increased by introducing forced air through the louvers thus increasing the rate of evaporative cooling. If it is desired to use shade for cooling, the unit producing shade should be something artificial, like a canopy, and not natural, such as trees. Trees are not satisfactory because leaves, branches and seeds fall into the pool to cause added turbidity, and an increase of solids to be removed by the filters.

Assuming the pool to be indoors, the heater would have a capacity of 2500 gph which requires a heating coil of not less than 19.6 sq ft of tube surface when steam is supplied at atmospheric pressure. See Table 5 for the allowable gallons per hour per square foot of tube surface at varying pressures.

Miscellaneous Considerations

Promenades and Walkways. The promenade or walkway must slope away from the pool body. Some authorities recommend that there be a raised edge 2 in. or more in height between the walkway and the pool, but this edge may lead to accidents by tripping the bathers and therefore should not be recommended for indoor pools. In an outdoor pool, this raised edge would permit a better flushing of the promenade and if installed, the top should be higher than 2 in. and it should be at least one foot wide. In other words, there is a definite step boarder around the pool.

Promenades should be constructed of non-slip tiles or concrete and should be not less than 4 ft wide, although 8 to 10 ft wide is preferred. Install drains in this walkway to provide adequate drainage of the area. Approximately one drain for every 100 sq ft of floor area provides good drainage. These drains can be connected to the scum gutter piping or directly into the sewer or house drain piping.

Sumps. In order that no back pressure be placed on a filter during backwash, when the pools are located below grade, it is preferable to install a sump pump in a pit with the motors mounted above the pit. They should be installed in duplex because in the event of failure, the pit would overflow and cause damage to other equipment.

The pump construction is dependent on the location and economics. Because the backwash contains grit and other abrasive material, the bearings of the pump are of prime consideration and should be either very soft or very hard; however, this increases the cost of the pump and in most cases, makes it more economical to install a standard bronze fitted pump with standard bearings, replacing them periodically. Figure 14 shows a typical installation of pump and float switch while Fig. 15 and 16 show methods of installing the sump frame and cover.

The sump pump illustrated is the submerged type directly connected to the motor by a flexible coupling. A self aligned adjustable roller thrust bearing must be provided at the sump cover plate to take the weight of the pump shaft and impeller. The discharge of the pumps should be provided with a check and gate valve.

Pump size is predicated on the size of the pit from which the water is to be pumped. If the pit is large enough to retain all the backwash water between backwashes, the pump can be of low capacity so as to empty the pit prior to the next backwash. Usually the pit takes the discharge of water from other areas and because it becomes too large, the pump capacity is increased. The pit size is then decreased within reasonable limits.

Now assuming that duplex filters in accordance with our selection (62.5 sq ft filter area each) are to be used, and that one filter will be backwashed at any one time, then the backwash water would be:

$$10 \frac{\text{gpm}}{\text{sq ft}} \times 62.5 \text{ sq ft} = 625 \text{ gpm}$$

If the pit is made 6 ft x 4 ft x 3 ft below the invert of the inlet, it can retain

$$6 \text{ ft} \times 4 \text{ ft} \times 3 \text{ ft} \times 7.5 \text{ gal per cu ft} = 540 \text{ gal}$$

Therefore, if we used a pump that has a capacity greater than the difference between the discharge and the gallons retained, we would have sufficient capacity. So we would use pumps having a capacity of 100 gpm.

In the event that the diatomite is to be reclaimed, a separate chamber should be provided. This may be accomplished by placing a weir across the pit between the influent and the pump suctions.

Credit

Acknowledgement is made to E. W. Ketchum, head of the sanitation department of Meyer, Strong & Jones, for his aid in compiling data for this article.

TABLE 5—HOT WATER HEATER OUTPUT PER SQUARE FOOT OF HEATING COIL SURFACE

Final Temperature (as Related to 40 Deg F Initial Temperature)	Steam Pressure, Psi					
	0	5	10	15	25	40
	Gallons per Hour per Square Foot of Coil Surface					
80	128.0	140.0	150.0	159.0	170.6	197.2
100	79.2	86.8	91.4	99.6	109.6	123.6

Below and on the following pages are given brief digests of the advertisements appearing in this month's issue. Use this Digest to locate and refer to the advertisements in which you are particularly interested, then fill out and mail the prepaid postcard to request further information from manufacturers.

The items appear in the same order as the advertisements to which they refer, to facilitate obtaining further information after reading an advertisement. NOTE: All advertisements are digested here except those received too late for inclusion. The Index of Advertisers lists all the advertisements in this issue.

Use the postcard below for catalogs, new equipment and materials, as well as Ad-Digest items.

STEAM TRAPS. A contractor can cut costs by using this company's steam traps. The high capacity of each trap enables selection of a size smaller than you would otherwise use. Straight-through horizontal or vertical connections as well as right-angle trap available. Strainers are seldom needed. Steam trap and unit heater trapping books available.
Inside front cover — Item 94

CERTIFIED FANS. Fan ratings in cfm are certified, so there need be no guesswork when you select. Accurate wind tunnel tests made in accordance with the appropriate NAFM plate. Fans conform to U. S. Department of Commerce standard 178-51. Bulletin available.
Page 1 — Item 95

HEATING - COOLING CONDITIONER. Hot water is teamed with chilled water air conditioning in a single central system. without duct work or window obstruction for year-long residential comfort. Time-tested and performance-proved. Information available.
Page 2 — Item 96

RELIEF VALVES. Additions to its line of ASME-rated T&P relief valves are announced. A complete line of these pressure steam rated and temperature water rated automatic reseating relief valves are available to the contractor. ¾ in. male inlet valve is illustrated. Information available.
Page 4 — Item 97

ALUMINUM INSTALLATION. Each week 76 quarts of water permeate the average home. Timber rots, paint peels. plaster crumbles, and steel beams rust. Breakdown of above shown. Multiple sheets of aluminum give full-depth, uniform protection. Available in prefabricated lengths of 375 to 750 ft. Booklet available.
Page 7 — Item 98

WROUGHT IRON PIPE. Radiant heating system serving 22,500 sq ft of floor area in Pacific Telephone & Telegraph Company's new warehouse at San Leandro, Calif., is illustrated, showing application of this company's wrought iron pipe. The system is safeguarded against premature failure and costly repair. Bulletin available.
Page 9 — Item 99

UNIT HEATERS. A broad line of industrial unit heaters, with wide range of sizes and capacities, versatile, of rugged construction and good appearance is guaranteed by manufacturer with 40 successful years behind him. Four models are illustrated. Bulletins available.
Page 11 — Item 100

STORAGE WATER HEATERS. New addition to this company's catalog on storage water heaters now ready. All information required for architects, engineers and contractors is included. Sections on plain steel, copper lined, copper silicon, cement lined heaters are complete with installation data.
Page 13 — Item 101

HEATING SPECIALTIES. Page 38. The line of heating specialties offered by this company includes packless radiator valves, thermostatic radiator traps, vents, bucket traps, and boiler gages. A catalog of all the items in the line is available.
Page 14 — Item 102

ZINC COATED STEEL. Company's product gives a better job at lower cost. It fabricates easily, takes the toughest crimping, bending, twisting, lock seaming, and the deepest draws. Its tight zinc coating stays on for keeps. Booklet available.
Page 15 — Item 103

BOILERS. Steam needs between 4000 and 120,000 lb per hr can be met by one of this company's boilers. Economical performance is promised. Vertical unit boilers and packaged boiler shown. Made for any capacity, pressure, fuel, or method of firing. Information available.
Page 16 — Item 104

PNEUMATIC CONTROLS. Called the finest control system for offices, factories, stores, hospitals, public and commercial buildings, it features the two most desirable features of modern air conditioning control: flexibility and simplicity. Basic components of system graphically illustrated. Information available.
Insert 17 to 24 — Item 105

BRASS ROD. Users of brass rod enjoy the same standard of quality and service responsible for the popularity of the company's copper and brass tube and pipe during the past 25 years. Automatic production and testing methods resulted in uniformly perfect product. Information is available.
Page 25 — Item 106

AIR CONDITIONING CONTROLS. Supervisory data center provides automation for air conditioning. Installation in Bank of the Southwest Building, Houston, Tex., illustrated. Also shown are individual instruments for measurement and control, including control of water flow, temperature, and measurement of total transfer of Btus. High pressure and velocity air blender also illustrated. Its dial is adjusted only once, when unit is uncrated or at time of installation. Information available.
Pages 26 to 29 — Item 107

ELECTRONIC AIR CLEANER. Prices on new model electronic air cleaner have been reduced by ¼ while capacities have increased by ½. They are now less costly to own and operate than automatic mechanical filters. Rapid, economical field assembly. To be exhibited at exposition.
Pages 30-31 — Item 108

GLASS FIBER INSULATION. Recent substantial addition to its production facilities makes possible announcement that company's one-piece, molded pipe insulation of fine glass fibers is no longer in short supply. It has the highest thermal efficiency, lower applied cost, and is of extremely light weight. Brochure available.
Pages 32-33 — Item 109

HIGH VELOCITY SYSTEMS. Installation of company's all-air high velocity ducts and diffusers solve the problem of flexibility in the Medical Towers Building, Houston, Texas. Illustrations show building under construction and drawing of typical suite. Selection manual available.
Pages 34-35 — Item 110

GALVANIZED STEEL SHEET. Steel sheets are strong but flexible, hold up under tough forming like snap locks or Pittsburgh lock seams, yet coating is so uniform that forming is easy.
Page 36 — Item 111

Circle numbers corresponding to the items and advertisements in which you are interested. Print your name and address clearly. Information will be sent directly from manufacturers.

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87
89	90	91	92	93																
94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114
116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136
138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158
160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202
204	205	206	207	208	209	210	211	212	213											

PLEASE PRINT Feb. H-57

This service available only to U.S. and Canadian readers.

Name .....

Firm .....

Nature of Firm's Business .....

Street .....

City ..... **Zone** .... **State** .....

This card is void after May 1, 1957

CENTRIFUGAL PUMPS. The Stearns-Rogers Building, home office of the firm at Denver, Colo., shown. This company's centrifugal pumps illustrated, were used. Centrifugal pumps from ¼ hp up are ideal for cooling towers or chilled water service anywhere. Minimum maintenance with maximum efficiency. Information available.
Page 37 Item 112

AIR CONDITIONING CONTROLS. This company's air conditioning control system helped transform 44-year old 80 Maiden Lane Building in New York City financial district into a comfortable and efficient office building. Productivity of employees was increased 9.3%. Information available.
Pages 38-39 Item 113

PACKAGED AIR CONDITIONING. Cooling with minimum installation time and cost can be had with packaged air conditioning with or without duct work, to cool either single areas or multi-story buildings like the Sportsman's Park clubhouse, illustrated. Line of 286 models are specifically suited to particular requirements yet are at standard-model cost. Information available.
Page 40 Item 114

COUNTERFLOW HEATERS. Counterflow heater is built around a new concept of burning fuel to produce efficient space heating. Unit has new jet burner, discharge plenum that distributes heat at high velocity without draft, high economy tubes, combustion chamber guaranteed for ten years, burner that works well on No. 5 oil and low horsepower fans. Available from 250,000 to 2 million Btu. Can be floor mounted, suspended horizontally or inverted. Information available.
Page Insert 41 to 44 Item 115

THERMO VALVES. Twelve reasons why this company's thermo valves are superior are discussed. Engineered for trouble-free operation. Non-adjustable, hermetically sealed models also offered. Bulletin available.
Page 45 Item 116

GALVANIZED SHEET STEEL. Tough fabricating jobs are made easy with this company's non-flaking galvanized sheets. Non-flaking zinc coating eliminates redipping and touch-ups and does away with machine downtime due to clogging. Shops report savings in fabricating costs up to 25%. Ray Simpson, top ranking U. S. archer, fails to flake coating when his arrows pierce steel sheets. Booklet available.
Pages 46-47 Item 117

AXIAL FANS. An axial fan made by this manufacturer is an integral part of the duct in which it is installed. One can choose from a standard line of over 136 models, specially designed to meet the needs of modern industry. Bulletin is available.
Page 48 Item 118

EXPANSION JOINTS. More efficient than expansion bends, expansion joints cost less because there is less heat loss, pressure drop, and they take less space. Three types are illustrated. Bulletins available.
Page 49 Item 119

AIR CONDITIONING EQUIPMENT. Company's 1957 lines are the broadest in its history. Its matched equipment is built to work together. Induction unit, installed in many leading buildings, is illustrated. Ceiling-hung heating, ventilating units also illustrated. Information available.
Pages 50-51 Item 120

AIR HANDLING EQUIPMENT. Company's engineered products for air conditioning, heating and ventilating, for commercial, industrial, institutional, and residential applications include ceiling diffusers, high pressure diffuser units, supply and return air grilles, and registers, convectors and baseboard. Information available.
Pages 52-53 Item 121

FIRE PROTECTION EQUIPMENT. Architects, engineers and contractors prefer this company's products and models illustrated for interior fire protection in hospitals, hotels, apartment and office buildings. Recent installations illustrated. One unit gives choice of 4 hose sizes, 4 lengths. Another adds handy water source for use by fire department. Catalog available.
Page 54-55 Item 122

EXHAUSTERS. Company's direct drive and belt drive power roof exhausters, relief vent and air intake, centrifugal wall exhauster and axial type roof exhauster are illustrated. Each unit is tested for quietness under simulated field conditions before leaving the factory. Information available.
Page 56 Item 123

GATE VALVES. Gate valves are made by this company with bronze or nickel alloy wedges. Bronze gate valves are available with Monel seat rings for 200 and 300 psi. The line of valves offers different patterns. Information is available.
Page 57 Item 124

ELECTRONIC CONTROLS AND DIFFUSERS. A comfort chart is shown. Whatever the air conditioning needs, company guarantees results that meet requirements shown on the chart with combination of its electronic automatic controls and patented air distribution devices. System provides draft free, quiet, uniform distribution of air at constantly held, comfortable temperature regardless of outside temperature changes.
Pages 58-59 Item 125

AIR CONDITIONING EXPOSITION. The 13th International Heating & Air-Conditioning Exposition will be held in the International Amphitheatre in Chicago February 25 to March 1 under the auspices of ASHAE. Exposition company suggests you write for advance registration.
Page 60 Item 126

SOUND TRAPS. Sound traps are made by this company to silence air conditioning noise of all frequencies in the audio-frequency range. A 7-ft unit suppresses as much sound as 100 ft of ordinary duct lining. Four series cover applications ranging from offices to recording studios. Booklet is available.
Page 61 Item 127

MOTORS. Company's long and specialized experience is at your disposal to solve your motor problems. On-time delivery of motors that exactly fit your needs is promised. Various models illustrated from 1/30 to 5 hp. Information available.
Page 62 Item 128

CONDENSING UNITS. This line of refrigeration and air conditioning condensing units includes the right size for every job, from ¼ through 100 hp. There are over 180 supply depots. Semi-hermetic and open type units illustrated.
Page 63 Item 129

ELECTRONIC AIR CLEANER. A complete range of electronic air cleaners for any type of air conditioning or ventilating system is offered. Individual cells are stacked like building blocks, to customers' needs. Diagram shows efficiencies. Will be on display at Exposition.
Pages 64-65 Item 130

COOLING TOWERS. Induced draft cooling towers are being equipped by this company with permanently sealed and lubricated fan bearings to eliminate moisture and periodic greasing. The towers have 4-blade, deep-pitch fans to cut down the noise level. Bulletin is available.
Page 66 Item 131

BOILER WATER LEVEL CONTROLS. Pump controllers and low water cutoffs are shown installed in two large firebox boilers in big, new addition to San Antonio's famous Santa Rosa hospital. Two controls are used on each boiler, the upper solely for the feed pump, the lower to cut off the gas burner. The second more than pays for itself by avoiding unnecessary service calls. Information available.
Page 67 Item 132

AIR COOLED CONDENSERS. As engineers plan larger tonnage installations, more of this company's remote type air cooled condensers that require no water are sold. They can be used with any size compressor regardless of horsepower. Requires less horsepower, less piping and is easier to install. Bulletin available.
Page 68 Item 133

HEATING PUMPS. Six types of heating pumps are illustrated. They all feature quiet operation, low inlet connections, and accessibility for inspection. A pump is available for each and every heating requirement. Bulletins available.
Insert bet. 68-69 Item 134

POWER EXHAUSTERS. Claimed the most efficient, these power exhausters for industry, institutions, and residences are available in capacities of 56 standard and heavy duty models, 6 to 30 inches in diameter, 8400 cfh to 1,005,960 cfh. Greater capacities on special order. Excels in venting paint booths, corrosive gases, and high temperatures. Information is available.
Page 69 Item 135

VALVES FOR BOILER PROTECTION. Complete protection for hot water boilers is provided by units shown which include four safety devices combined. Reducing valves with anti-syphon feature prevent backflow of water when pressure drops. Relief valves are now available in 3 and 4-million Btu units. Literature available.
Page 70 Item 136

ROOF VENTILATORS. Roof ventilator twins, centrifugal and propeller type, are economical, space saving units to simplify ventilating problems. They will exhaust against high resistances effectively from hoods and duct work. Completely weather proof and corrosion resistant and easily accessible for maintenance. Modern design compliments any exterior. Bulletins available.
Page 71 Item 137

Postage Will be paid by Addressee

No Postage Stamp Necessary If Mailed in the U. S.

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

AIR CONDITIONING, HEATING AND VENTILATING
93 WORTH STREET
NEW YORK 13, N. Y.

AD-DIGEST SERVICE

AIR CONDITIONING EQUIPMENT. You are invited to review company's line of unit and packaged conditioners, centrifugal refrigeration machines, fans, fluid drives, utility sets and unit heaters at the Exposition. There will be motion pictures, moving displays, and literature. Information available.
Page 72 Item 138

FORCED DRAFT FIRING. Advertisement shows how this company's firing system is used. In one case unit is integrated with matched Scotch boiler. In the second case it is pointed out that firing unit can be applied to all types of boilers. Enire system is factory built, wired and tested. Catalog available.
Page 73 Item 139

STEAM TRAPS. Bucket and thermostatic traps illustrated. Low maintenance cost, highly efficient, and easily accessible interior design are featured. They function more effectively and economically in removing condensate from steam lines and equipment. Each has removable cover, pin, and seat for quick inspection and cleaning. Catalogs available.
Page 74 Item 140

STEAM GENERATORS. Four 125-hp steam generators are installed in Armstrong High School, Richmond, Va., providing efficient, dependable heat and hot water. Hundreds of highly efficient school buildings are so equipped. Complete packages are factory fire tested to insure peak performance. In 18 sizes from 20 to 600 bhp for pressure to 250 psi, they are also for hot water. Catalog available.
Page 75 Item 141

BLOWERS. Blowers are not off-the-shelf units but are built to customer rotation and discharge specifications. Each one receives 100% inspection before it leaves the factory. NAFM and NEMA standards throughout. Bulletins available.
Page 76 Item 142

HEATING AND COOLING UNITS. Every room is a separate heating zone with its own thermostat with this company's heating and cooling systems. Modulation from slow idling speed to full capacity is provided. Ideal for any type of building or home, new or old. Individual unit cooling makes the perfect two-some for year-round comfort. Literature available.
Page 77 Item 143

AIR CONDITIONING, HEATING. Complete line of air conditioning and heating products, to be shown at Exposition, results in economical, single source responsibility. Items include unit heaters, pumps, control systems, steam specialties, hot water specialties, convectors, baseboard radiation, condensers, cooling towers and direct expansion coils.
Pages 78-79 Item 144

INDUSTRIAL FANS. These industrial fans take large or small particles in stride. The secret is their versatility. A wide range of fan arrangements and packaged construction eliminates complications. Information available.
Page 80 Item 145

STEAM TRAPS. A full line of thermostatic traps, float and thermostatic traps, and steam traps ranging in capacity from 25-in. vacuum to 600 lb are available from this company. Kellogg High School, Idaho, can count on years of trouble free service with few maintenance problems because they installed this company's traps. Bulletin available.
Page 81 Item 146

ELECTRIC MOTORS. Designed specifically for quiet operation, their use in air conditioning applications is recommended in hospitals, hotels and office buildings where silence is a prime specification.
Page 82 Item 147

MOTORS. A complete motor line plus quality and service is guaranteed by this company's national network of more than 200 franchised outlets. Buying is simplified; and continuous production guarantees delivery to your shop in a matter of hours. Information is available.
Page 82 Item 148

AIR FILTERS. More than 50 sq ft of media are included in one unit of these versatile filters. The mechanical filters are specially designed for higher air cleaning efficiency and higher dust holding capacity. Multiple frames contain 13 times more media area than face area.
Page 83 Item 149

UNITS CHANGE OWN FILTERS. A new, completely automatic filter is available in these air handling units. Once installed, filter media can be forgotten for a year's time. You save on costly filter changes, get maximum filtering efficiency at half the cost of disposable filters. Information available.
Pages 84-85 Items 150-151

STEEL PIPE. Long, maintenance-free life for radiant heating installations is promised with use of this company's steel pipe. Uniform ductability, lengths, threading, weldability, wall thickness, strength, toughness, roundness and straightness are reasons why you should specify.
Page 86 Item 152

VALVES FOR AIR CONDITIONING. Filter drier protects entire system from moisture, acid, sludge and foreign substances. Solenoid valves minimize possibilities of electrical failures. Thermostatic expansion valves practically eliminate hunting. Information available.
Page 87 Item 153

CABINET UNITS. Cabinet units are made by this company for steam or hot water heating and chilled water cooling. They can be installed upright or inverted, fully exposed, recessed or concealed on walls, floors or ceilings and can be used with or without ducts.
Page 90 Item 154

FANS. Packaged roof ventilators, high efficiency centrifugal fans, and packaged propeller fans will be displayed at exposition. Class II, III and IV fans have 86% mechanical efficiency. Propeller fans up to 120 in. Information available.
Page 91 Item 155

COOLING EQUIPMENT. In stock for immediate shipment are pumps, straight tube and shell and coil condensers, liquid receivers, heat exchangers, and evaporators, as illustrated. Packaged liquid cooler shown. Information available.
Page 145 Item 156

ALUMINUM DUAL-DUCT UNITS. More than two thousand units like the one illustrated have been installed to provide ultra-flexible air conditioning in New York's Rockefeller Center. Now available in aluminum, it's a company exclusive.
Page 147 Item 157

BLOWERS. You are urged not to overlook this company's display at the Exposition, including new non-overloading backward curved packaged utility set and power roof ventilator with full venturi curved inlet cone. Information available.
Page 149 Item 158

FLOATS. Company is prepared to solve liquid level control problems involving floats and provides complete technical data on types, sizes and suitable metals for floats, depending on conditions. Made in a variety of metals in sizes from 2½ to 14 inches. Catalog available.
Page 152 Item 159

FORCED DRAFT COOLING TOWER. To be shown in action at exposition. Cooling towers permit taking full advantage of the efficiency and dependability of water-cooled condensers, at lower cost, with no moving parts, and in attractive and compact package, 3 to 20 tons. Information available.
Page 152 Item 160

PRESSURE GAGE. The unique design of this pressure gage guarantees it cannot be harmed by sudden pressure surges, shock loading, or severe vibration. It is sensitive to pressure, pressure differentials, or vacuum. Bulletin is available.
Page 152 Item 161

COPPER TUBING. America's leading distributors have chosen this company's copper tube to sell and recommend because its quality and performance can be depended on to uphold their reputation for giving customers satisfaction.
Page 153 Item 162

OVERHEAD GAS HEATER. Gas fired, forced convection, overhead gas heater with company's exclusive electric ignition and sealed combustion system illustrated. Claimed the greatest improvement in overhead heating in 25 years.
Page 155 Item 163

REFRIGERATION EQUIPMENT. America lives better because this company furnishes the finest in air conditioning and commercial refrigeration. These products, including belt driven condensing units, hermetic compressors, automotive and truck compressors will be on view at the Heating and Air Conditioning Exposition in Chicago.
Page 157 Item 164

AIR CONDITIONING EQUIPMENT. Eighteen pamphlets containing helpful air conditioning and refrigeration data are available from this manufacturer of heating, ventilating and air conditioning units. Items include the cooling tower, a discussion of steam, water and direct expansion, air handling, the air cooled condenser, central plant air conditioner, and ceiling-hung conditioners.
Page 158 Item 165

NEW HEAT SOURCE. Company offers a new source of low cost heat for stores, garages, schools, factories, churches and warehouses. They are heat diffusers, direct fired, for use with gas or oil. Completely self contained. They cost less to own, install and operate.
Page 158 Item 166

BALL BEARINGS. Manufacturer's ball bearings are designed expressly for residential heating and air conditioning equipment. The bearings feature balls and races especially finished for quiet performance.
Page 159 Item 167

NYLON EXHAUST HOSE. Made of strong neoprene-coated cotton or nylon fabrics, spiral wire reinforced flexible exhaust hose is recommended for fume control. Durable and light weight, it is easy to cut, install, connect, re-use, and re-locate. Information available.
Page 160 Item 168

STEAM TRAPS. Thermostatic steam traps are guaranteed freeze proof. Special valve and seat are designed to resist scoring. Bulletin available.
Page 160 Item 169

BOILERS. Company's first boiler went to Schenectady Locomotive Works in 1888. In 1955 two more boilers went to the same company, providing 100,000 lb of steam per hr for heating, for driving plant auxiliaries and for power generation, bring the number to 40. They have operated at higher efficiency than the design contractor specified.
Page 163 Item 170

AIR FILTERS. Air filters are made by this company of soft glass fiber which provides a dust collecting area without interfering with air flow. They are moisture proof and fire resistant. The glass fiber filter does not splinter or shred. Information is available.
Page 165 Item 171

HOT WATER STORAGE HEATER. Tampa Electric Company's new center has this company's new corrosion-resistant, copper-silicon storage heater serving 2300 gal of piping-hot water per hr. Round-the-clock demands met with minimum maintenance.
Page 167 Item 172

CIRCULATING PUMPS. These pumps used in hot water heating systems are silent, vibrationless in operation. Electric motor operates almost silently, yet has plenty of stamina to hold up under years of steady operation. Company's nearby engineer will help you select the motor to meet your specifications. Information available.
Page 171 Item 173

AIR CONDITIONING CONTROLS. Indoor-outdoor control system incorporates thermally sensitive resistors called thermistors. A new concept in temperature control, system automatically raises indoor temperature as outdoor temperature drops. Bulletin available.
Page 173 Item 174

PAPER AIR FILTER. Nearly 100% efficiency air filtration is promised at low cost. Paper after filter, when used in conjunction with permanent filters, gives cleaning efficiency that rivals the most expensive equipment at only a fraction of the cost. Technical data available.
Page 175 Item 175

PUMPS FOR STEAM SYSTEMS. A

specific type of pump for every steam heating system is offered for any standard or unusual conditions: for below-floor returns; low vacuum systems; small capacity, high pressure requirements. Details and free survey of your requirements available.
Page 177 Item 176

COOLING TOWERS. Company's cooling towers have high cooling efficiency under all climatic conditions. All parts are designed for easy erection and access. Towers have a minimum maintenance record with three Flint, Michigan, department stores. Bulletins are available.
Page 178 Item 177

HIGH PRESSURE AIR DEVICES. For 100% control and distribution of high velocity air a line of high pressure terminals and distinctive air diffusers are offered. A wide variety of diffuser patterns are available. Catalogs contain information and useful engineering data for each pipe.
Page 179 Item 178

INDUSTRIAL VENTILATION. Heavy-duty industrial ventilating equipment, including complete ventilating systems for custom installation, offered. To be at Exposition. Information available.
Page 180 Item 179

REGISTERS AND GRILLES. A line of registers and grilles are offered for control of warm air heating and for year-round heating and cooling. Line includes single damper forced air registers, ceiling air diffusers, perimeter baseboard diffusers and registers, and perimeter floor registers. A catalog is available.
Page 181 Item 180

CHILLERS, HEAT TRANSFER UNITS. Company's entire line will be on view at ASHAE Show in Chicago. Many variations of packaged chillers, oil separators, condensers and heat interchangers from this company's engineered line of heat transfer equipment will be on view.
Page 182 Item 181

GAS UNIT HEATERS. Suspended gas unit heaters are made by this company for all industrial and commercial heating requirements. Gas-fired duct furnaces are also made for heating and heating-cooling systems. Catalog is available.
Page 184 Item 182

BRONZE VALVES AND FITTINGS. Company's globe valve with renewable disc, gate valves, and globe valve with special seat and disc are illustrated. They are built to give dependable, trouble-free service on all recommended jobs. Specifications are given. Information available.
Page 185 Item 183

PUMPS FOR AIR CONDITIONING. Standard centrifugal pumps contribute to efficient, economical air conditioning service. Three types of units are illustrated and cover a range of capacities from 5 to 1000 gpm. Bulletins available.
Page 186 Item 184

ELECTRIC HUMIDIFIERS. Automatic electric industrial humidifiers are designed to provide capacity for practically any size requirements. The humidifier, introducing humidity as a water vapor, removes up to 70% of all bacteria in the air stream circulating through the unit. Information is available.
Page 187 Item 185

FANS WITH ALUMINUM BLADES. Extruded aluminum blades combine in one design the advantages of a light weight metal, a hollow structure, and the superior strength of wrought metal. Easily assembled in the tower, fan requires no special handling equipment. Information available.
Page 188 Item 186

PRESSURE BURNER. This company's burner looks like a residential type but is a heavy duty machine firing efficently into combustion chamber pressures of 3 in. or more. Fuel is oil, gas, or both. Data sheets are available.
Page 190 Item 187

AIR CONDITIONERS. This company's units were chosen to do the job for the largest power plant ever built in history, the Clifty Creek plant at Madison, Indiana. Each zone is individually cooled because each packaged unit is individually controlled. Information is available.
Page 191 Item 188

SECTIONAL CONDENSER. The casing of this company's condenser is made of sections each separately removable to give access to all parts. The unit removes superheat before condensing and keeps the system purged of oil. Capacity range is from 90 to 240 tons. Bulletin is available.
Page 192 Item 189

MOTOR CONTROLS. Solenoid starters for air conditioning and refrigeration motors have one moving part, no pins, pivots, or bearings to corrode and bind. Motor control's overload relays retain their accuracy. Magnetic circuits hold through wide voltage fluctuations. Catalog is available.
Page 193 Item 190

RADIANT-ACOUSTICAL CEILING. Economy in radiant ceiling is now possible with this completely integrated radiant acoustical ceiling. All radiant duct work, aluminum acoustical panels, diffuser panels and framing for recessed fixtures are supplied. Application in Beckley, W. Va., hospital illustrated. Booklet available.
Page 194 Item 191

VANEAXIAL BLOWERS. Blowers last longer, do a better job, have long life, rugged reliability and maximum maintenance. Heavy-gage steel is used throughout. All units rated according to standard test code. Top quality motors supplied. Information available.
Page 195 Item 192

TIME SWITCH. New weather reset time switch makes all heating control systems fully automatic. It changes the time heating starts as outside temperatures change; permits thermostat to control heat flow during the day; stops heat flow as outdoor temperatures rise above 65 deg F and adjusts system for mild weather and unusual conditions.
Page 196 Item 193

AUTOMATIC BOILERS. Six reasons compel the selection of this company's automatic boilers. Efficiency is guaranteed 80%. Simple two-pass design results in uniform flow of combustion gases to all return tubes. Also, there is maximum radiant heat transfer, high CO_2, low temperature stack gases, rapid water circulation, and easy access to furnace and all return tubes. Bulletin available.
Page 197 Item 194

INDUSTRIAL HEATERS. You are invited to inquire about this company's heaters before you decide. These heaters are found in plants, warehouses, and factories wherever the best equipment is employed. Line includes stainless steel direct fired heaters for gas, oil, or dual gas and oil in capacities from 300,000 to 2 million Btu. Information available.
Page 198 Item 195

AUTOMATIC REGULATING VALVES. Every engineer knows from experience that any valve designed to control temperatures or pressures within tight limits can be affected by dirt or other foreign matter in steam lines. Trouble shooting is faster, downtime is reduced and tempers don't take such a beating. Bulletin is available.
Page 199 Item 196

FURNACES. A powered series, gas fired, suspended series, oil fired suspended series and a series of direct fired furnaces are illustrated. Company will be represented at Heating and Air-conditioning Exposition in Chicago.
Page 200 Item 197

REFRIGERATING MACHINES. Eight of this company's refrigerating machines were installed recently to air condition an 11-story Texas building. The compressors have the company's 9-cylinder design. The company manufactures a full line of air conditioning and refrigerating machinery. Estimates, bulletin available.
Page 201 Item 198

PLASTIC LEAD SEAL. One compound serves for many services: Water, oil, gas, steam, chemicals, and petroleum products, low and high pressures. One application lasts forever; never hardens. Free sample available.
Page 202 Item 199

VELOMETER. Velometer measures actual air delivery. Simple, direct reading gives instant measurement in any distribution system. Compact, portable, easy to understand and to use.
Page 202 Item 200

REFRIGERANT INDICATORS. Refrigerant indicators are made by this company in six sizes from ⅜ to 1⅜ in. ODS. They have a preformed copper extension that eliminates the need for separate gaskets. Catalog is available.
Page 202 Item 201

INDUCTION SYSTEMS. High pressure induction air conditioning systems designed by this company offer quiet operation, small ducts, individual room or occupant control, positive ventilation, remote location of mechanical equipment, and flexibility of partition changing. Details of system are available.
Page 203 Item 202

HUMIDIFYING SPRAY NOZZLES. For your convenience spray nozzles and related accessories for humidifying are available from a single dependable source. For industrial installations everything but piping, wiring, and compressor is provided. Bulletin is available.
Page 204 Item 203

ALL-ALUMINUM VENTILATORS. Direct drive and belt driven ventilators of all-aluminum construction are offered. Low silhouette design in both. Light starting torque increases bearing motor life. Catalog available.
Page 204 Item 204

FIN TYPE AND PIPE COILS. Fin type coils are made by this company for air conditioning, refrigeration, and heating in copper or steel hot galvanized. Pipe coils are also made in complicated assemblies or production runs from any type of pipe or tubing. Details are available.
Page 204 Item 205

CONDENSATE PUMPS. Company's low return condensate pumps are available in capacities of 500 to 15,000 EDR. They feature low return connection, low speed, long life, cast iron receiver, low water line and float switch control. Specification table included. Bulletin available.
Page 205 Item 206

POWER BOILERS. Company has been a leader in boiler design and construction for 93 years. Dependable, efficient, modern power boilers satisfy increasing demands of institutional, apartment, office and industrial buildings. Information available.
Page 205 Item 207

HEAT EXCHANGE COIL. The most talked about coil in the industry will be available for inspection at company's booth at Exposition Quotations given.
Page 206 Item 208

ELECTRIC HEATERS. Electric comfort heaters for low cost space heating are made in a choice of blower, convection, or radiant types with totally enclosed heating elements. Heaters are also made in portable, mounted, or built-in units from ¼ to 40 kw with automatic or manual controls. Catalog is available.
Page 206 Item 209

BACKWATER VALVES. Basement flooding can be ended with this company's backwater valves. Manually operated spade valve and automatic swing valve are features. Catalog available.
Page 206 Item 210

DISCHARGE FAN. Vertical discharge fan moves air at high velocity to keep fumes from leaking back into the building through openings. Designed specifically for industrial applications requiring large volume and high velocity, it has automatic wing dampers. Available with direct or indirect drive.
Page 207 Item 211

FANS AND AIR WASHERS. The Denver City Auditorium is equipped with a new respiratory system including this company's Type HV fans and Type V air washer. As in so many other notable buildings the nation over, this equipment was chosen for its recognized ability.
Page Inside back cover Item 212

AIR CONDITIONING CONTROLS. Company's automatic temperature system will control unique radiant heating system in new University of Maryland's activities building. Hot water circulated under each seat of arena. Information available.
Page back cover Item 213

13th Heating and Air Conditioning Show and 63rd ASHAE Meeting Will Be Held in Chicago

THE air conditioning, heating and ventilating industry will be centered in Chicago during the week of February 25 to March 1 when attendance at the 63rd annual meeting of the American Society of Heating and Air-conditioning Engineers and the 13th International Heating and Air Conditioning Exposition is expected far to exceed that at any prior meeting and show.

Approximately 485 exhibitors have reserved space in Chicago's International Amphitheatre for the Exposition which opens Monday, February 25 at 2 p.m. and remains open until 10 p.m. On Tuesday, Wednesday, and Thursday it will be open from noon to 10 p.m. and on Friday, March 1, from noon to 6 p.m.

On the pages which follow, exhibitors are listed together with their booth numbers; the diagram of the Exposition appears on pages 134-135.

Two symposiums and thirteen papers will be presented as part of the technical program for the annual meeting of the American Society of Heating and Air-conditioning Engineers, to be held at the Conrad Hilton Hotel, Chicago, February 25 to 28.

The Society's F. Paul Anderson Medal will be presented to M. K. Fahnestock, research professor of mechanical engineering, University of Illinois, at the annual banquet. A dinner will be held on Monday evening (February 25) at which honor will be paid to Dr. A. C. Willard, past president of the Society and president emeritus of the University of Illinois.

The papers to be presented at the ASHAE meeting are as follows:

MONDAY—February 25

9:30 a.m. FIRST SESSION (Waldorf Room)

Study of Three Redwood Cooling Tower Packings, by W. W. Smith

Earth as Heat Source and Sink for Heat Pumps, by D. M. Vestal, Jr. and B. J. Fluker

From '36 to '56; Air Conditioning Comes of Age, by W. A. Grant

12:00 noon WELCOME LUNCHEON (Grand Ballroom)

Speaker: Dr. Richard Heflebower, Chairman, Economics Dept., Northwestern University

TUESDAY—February 26

9:30 a.m. SECOND SESSION (Waldorf Room)

Revised Winter Outside Design Temperatures, by H. C. S. Thom

Pulsations in Residential Heating Equipment—Preliminary Results, by A. A. Putnam and W. R. Dennis

The Dust Spot Method for Evaluating Air Cleaners, by K. T. Whitby, A. B. Algren and R. C. Jordan

9:30 a.m. THIRD SESSION (Grand Ballroom)

Symposium on Dehumidification

WEDNESDAY—February 27

9:30 a.m. FOURTH SESSION (Waldorf Room)

Cold Wall Effects in a Ceiling-Panel-Heated Room, by L. F. Schutrum and T. C. Min

Performance of Covered Hot Water Floor Panels, Part II, by E. L. Sartain and W. S. Harris

9:30 a.m. FIFTH SESSION (Grand Ballroom)

Industrial Ventilation Symposium

THURSDAY—February 28

9:30 a.m. SIXTH SESSION (Waldorf Room)

Outlet Characteristics That Affect Downthrow of Heated Air Jets, by Linn Helander, Shee-Mang Yen, and Wilson Tripp

Air Flow in Free Convection over Heated Bodies, by T. F. Hatch and D. Barron-Oronzco

Radioactive Process Ventilation, by S. H. Glassmire, Jr. and J. B. Wahlen

Locations of Exhibitors

Diagram of exhibits, pages 134 and 135.

621 623 **A-J Manufacturing Co., Kansas City, Mo.**

655 **A-P Controls Div., Controls Corporation of America, Milwaukee, Wis.**

1141 **Ace Engineering Co., Chicago, Ill.**
Horizontal rotary oil burners, combination oil-gas burners, and forced draft assemblies for pressurized scotch marine boilers.

903 **Acme Industries, Inc., Jackson, Mich.**

649 **Addison Products Co., Addison, Mich.**
651 Residential air conditioning equipment including air-cooled compressor-condensing units, evaporators, evaporator blower units, packaged conditioners, and dehumidifiers.

328 **Aerofin Corp., Syracuse, N. Y.**
Heating and cooling coils.

129 **Aeroquip Corp., Jackson, Mich.**
Flexible hose and fittings, self-sealing couplings, and Freon self-sealing couplings.

1016 **Air Conditioning, Heating and Ventilating, New York, N. Y.**
1018 Technical books and magazines.

342 **Air Control Products, Inc., Coopersville, Mich.**

425 **Air Controls, Inc., Division of The Cleveland Heater Co., Cleveland, Ohio.**
Blowers, blower filter units, exhaust fans, attic fans, and window fans.

1015 **Air Devices Inc., New York, N. Y.**
Diffusers, high pressure terminals, air and grease filters, and exhausters.

711 **Air Distribution Div. and Automatic Control Div., Barber**
715 **Colman Co., Rockford, Ill.**
Electric and electronic temperature controls, electronic temperature indicators, and recorder-controllers, combustion safeguard equipment, air distribution products.

209 **Air Distribution Products, Los Angeles, Calif.**
Ceiling diffusers and volume controls.

N-210 **Air Door, Inc., Division of New Castle Products, Inc., New Castle, Ind.**
Air door.

N-224 **Air Factors Inc., Monrovia, Calif.**
Ceiling diffusers, air curtain diffusers, and side wall diffusers.

N-212 **Airflex Corp., Champaign, Ill.**

N-316—**Airfloor Company of California, Inc., Norwalk, Calif.**
Warm air panel heating system.

550 **Air-Maze Corp., Cleveland, Ohio.**
Washable dry type air filter panel, electronic air cleaner, and automatic curtain type air filter.

N-546 **Air Moving And Conditioning Association, Inc., Detroit,**
N-546 **Mich.**
Distribution of bulletins.

320 **Air-Path Products Co., Baltimore, Md.**
Louvers and dampers.

41 **Air & Refrigeration Corp., New York, N. Y.**
Articulated air conditioning unit.

12 **Airtemp Div., Chrysler Corp., Dayton, Ohio.**
43 Room air conditioners, water-cooled and air-cooled air conditioners, auto air conditioning, and remote water-chiller and direct expansion systems.

N-326 **Ajax Boiler & Heater Co., Gardena, Calif.**

1163 **Alco Valve Co., St. Louis, Mo.**
Thermal expansion valves, venturi-flow distributors, solenoid valves, pressure regulators, and reversing valves for heat pump operation.

1051 **Aldrich Co., Wyoming, Ill.**
Low-pressure, steel heating boiler-burner units, hot water heaters, and high-pressure, conversion oil burners.

556 **Allen-Bradley Co., Milwaukee, Wis.**
558 Manual and magnetic motor starters, pressure switches,
560 temperature switches, float switches, control relays, and push buttons.

N-315 **Allis-Chalmers Mfg. Co., Milwaukee, Wis.**
Pumps, motors, control, and V-belt drive equipment.

N-305 **The Louis Allis Co., Milwaukee, Wis.**
Motors for heating and air conditioning.

38 **American Air Filter Co., Inc., Louisville, Ky., Herman**
40 **Nelson Division and Illinois Engineering Co., Chicago, Ill.**
Air filters, filtering media, electronic furnace filter, unit ventilator, radiator valves, steam traps, high vacuum control systems, power specialties, strainers, heat exchangers, condensation pumps, convectors, zone control systems, console heater, unit blowers, and unit ventilator accessories.

22 **American Blower, Division of American-Standard, Detroit,**
26 **Mich.**
Commercial packaged air conditioners, gyrol fluid drives, refrigerating machines, high-pressure fan, unit heaters, propeller fans, unit room conditioners, and air conditioning unit components.

346 **American Coils Co., Farmingdale, N. J.**
447 Air conditioners, self contained; heat pumps, water to air; packaged chillers; and cooling towers.

733 **American Foundry and Furnace Co., Bloomington, Ill.**

814 **American Furnace Co., St. Louis, Mo.**
Warm air heating, and cooling equipment.

1167 **American Gilsonite Co., Cleveland, Ohio.**
Gilsulate pipe insulation.

568 **American Hydrovac, Division of Pitz Foundry Inc., Brooklyn, N. Y.**
Jet heating vacuum pumps, rotary air heating vacuum pumps, and circulating pumps.

23 **American-Standard, Air Conditioning Div., Pittsburgh, Pa.**
Oil- and gas-fired air conditioners, add-on evaporator units, water-cooled air conditioner, and outdoor air-cooled condensing unit.

20 **American-Standard, Plumbing and Heating Div., New York, N. Y.**
Oil-fired boiler package; oil-fired boiler; high-pressure, single adjustment oil burner; heating baseboard; self-contained air conditioning system, and residential air conditioning system.

27 **Amercan-Standard, Kewanee Boiler Div., Kewanee, Ill.**
Job-built boilers, packaged unit for gas, packaged unit for oil, and boiler-burner unit.

126 **Ammerman Co., Inc., Minneapolis, Minn.**
Roof exhausters, relief vent.

659 **Anchor Div., Stratton & Terstegge Co., New Albany, Ind.**
Furnaces, stokers, oil burners, gas burners, air conditioners, and boilers.

747 **The V. D. Anderson Co., Division of International Basic Economy Corp., Cleveland, Ohio.**
Steam traps, air release valves, strainers, and purifiers.

6 **Anemostat Corporation of America, New York, N. Y.**
Air diffusers, all air high velocity units, and air meter.

315 **Ansul Chemical Co., Marinette, Wis.**
Drier and moisture indicator.

N-333 **Arkion Mfg. Co., Cleveland, Ohio.**

N-205 **Armco Steel Corp., Middletown, Ohio.**
Aluminum, zinc-coated, stainless, and cold rolled steel.

136 **Armstrong Cork Co., Lancaster, Pa.**
Flexible, foamed, plastic, pipe insulation, glass fiber duct and pipe covering, insulation adhesives, and cork products.

302 **Armstrong Furnace Co., Division of National Union Elec-**
401 **tric Corp., Columbus, Ohio.**
402 Residential warm air heating equipment; coal, gas, and oil furnaces; industrial furnaces, gas or oil; residential air conditioners, air or water cooled.

1158 **Armstrong Machine Works, Three Rivers, Mich.**
1160 Steam traps; humidifiers, commercial and domestic; hot water heat controls.

339 **Arrow-Hart & Hegeman Electric Co., Hartford, Conn.**

758 **The Auer Register Co., Cleveland, Ohio.**
Registers, grilles, and diffusers.

1155 **Aurora Pump Div., The New York Air Brake Co., Aurora,**
1159 **Ill.**
Close coupled, boiler feed pumps, and pedestal-mounted end suction pumps; vacuum and condensation return units.

336 **Au-Temp-Co Corp., New York, N. Y.**
338

421 **Auto-Flo Corp., Detroit, Mich.**
Automatic humidifiers, evaporator plates, and fuel oil filters.

1032 **Automatic Devices Co., Inc., West Springs, Ill.**
Time switches and regulators.

723 **Automatic Humidifier Co., Cedar Falls, Iowa.**

N-432 **Autorad Inc., Chicago, Ill.**
N-434

761 **B-I-F Industries, Inc., Providence, R. I.**
763 Proportioning pump for adding compounds to feed water, meter for steam, gas, or air flows, venturi insert nozzle.

671 **Bacharach Industrial Instrument Co., Pittsburgh, Pa.**
Combustion testing kits, temperature and operation recorders, air velocity meters, carbon monoxide detectors, gas pressure manometers, filter gages, and air circulation thermometer.

1009 **Baltimore Aircoil Co., Inc., Baltimore, Md.**
1011 Blow-through type evaporative condenser and draw-through type cooling tower.

N-335 **The Barber Mfg. Co., Gas and Oil Burner Div., Cleve-**
N-337 **land, Ohio.**
Atmospheric inshot and upshot, impinged-jet round and rectangular, and forced-draft gas conversion burners; and gas burners for heating and appliance manufactuers.

1046 **Barnebey-Cheney Co., Columbus, Ohio.**
Activated charcoal air purification equipment.

663 **Barry Blower Co., Minneapolis, Minn.**
Centrifugal blower wheels and housings, backward inclined and forwardly curved blowers and multiple blowers, utility ventilating sets, cast-iron blowers.

N-415 **Bastian-Morley Co., Inc., La Porte, Ind.**
Gas-fired boilers, water heaters, incinerators, and packaged boiler.

227 **Bayley Blower Co., Milwaukee, Wis.**
Fans.

1258 **Bell & Gossett Co., Morton Grove, Ill.**
1262 Specialties for heating and cooling.
1266

N-301 **Bendix-Westinghouse Automotive Air Brake Co., Evans-**
ville Div., Evansville, Ind.
Condensing units.

773 **Bett-Marr Mfg. Co., Hopkins, Minn.**
Band saws and cheek benders.

N-424 **Beverly Shear Mfg. Co., Chicago, Ill.**

1172 **Binks Mfg. Co., Chicago, Ill.**
Cool ng towers.

132 **The Bishop & Babcock Mfg. Co., Cleveland, Ohio.**
Power roof ventilator, power fixed blower, ventilating set, and squirrel cage wheel.

N-225 **Bohn Aluminum & Brass Corp., Betz Div., Danville,**
N-227 **Ill.**
Finned coils, air cooled condensers, and furnace bonnet units.

N-427 **Boston Machine Works Co., Lynn, Mass.**
Nozzle extractors, oil tank gages, draft stabilizers, combustion chambers, nozzles, nozzle service kits, steel baffles, and horizontal burners.

769 **Brandes Co., Madison, Wis.**
Warm air baseboard and baseboard diffusers.

1069 **Brookside Corp., McCordsville, Ind.**
Power roof exhausters.

1020 **Brown Products Corp., Forest Hills, N. Y.**
1022 Baseboard radiation, fin tube radiation, and air conditioning equipment, room units and chillers.

615 **The Brundage Co., Kalamazoo, Mich.**
Air conditioning and furnace blower line.

139 **Brunner Mfg. Co., Utica, N. Y. and The Brunner Co.,**
143 **Gainesville, Ga.**
44 Refrigeration compressors, compressor rack, packaged air conditioner, semi-hermetic compressors and condensing units.

N-314 **Buensod-Stacey Inc., New York, N. Y.**
Automatic flow control air mixing unit with galvanized steel and aluminum casings.

937 **Buffalo Forge Co., Buffalo, N. Y.**
Fans, roof ventilators, pumps, heaters, and exhausters.

761 **Builders-Providence, Inc., Providence, R. I.**
763

1040 **Burgess-Manning Co., Architectural Products Div., Chicago, Ill.**
Radiant heating, cooling and acoustical ceiling.

837 **Burnham Corp., Steel Boiler Dept., Irvington, N. Y.**
841 **Burnham Corp., Cast Iron Boiler Div., Irvington, N. Y.**
Cast iron radiant baseboards, packaged oil and gas boilers, and scotch type boilers.

755 **A. M. Byers Co., Pittsburgh, Pa.**
Wrought iron pipe, nipples, welded fittings, and plate.

N-339 **Calgon Co., Pittsburgh, Pa.**

409 **Cambridge Filter Corp., Syracuse, N. Y.**
Filters.

407 **Carnes Corp., Verona, Wis.**
Power roof ventilators, power side wall exhausters, registers, grilles, ceiling and sidewall diffusers.

515 **Carrier Corp., Syracuse, N. Y.**
517
519

N-246 **Carver Pump Co., Muscatine, Iowa.**
Close-coupled air conditioning centrifugal pump.

855 **Century Electric Co., St. Louis, Mo.**
Electric motors.

825 **Century Engineering Corp., Cedar Rapids, Iowa.**
829 Gas furnaces, oil furnaces, remote type air conditioners, attic or stow-away type self-contained air conditioners, and conversion oil and gas burners.

1072 **W. M. Chace Co., Detroit, Mich.**
Thermostatic bimetal controls and bimetal elements used for this purpose.

1166 **Champion Blower & Forge Co., Lancaster, Pa.**
1168 Fans and blowers.

873 **Char-Gale Mfg. Co., Anoka, Minn.**
Air diffusers, baseboard and ceiling; ducts and fittings; humidifiers; registers; and rain goods.

313 **Chemical Solvent Co., Birmingham, Ala.**
Water-cooled condenser cleaners, algaecides, protective paints, polarizer for prevention of boiler corrosion.

602 **Chicago Blower Corp., Franklin Park, Ill.**
703

30 **Chicago Pump Co., Chicago, Ill.**

817 **Clarage Fan Co., Kalamazoo, Mich.**
821

443 **Clayton & Lambert Mfg. Co., Lamneck Div. and Water Heater Div., Louisville, Ky.**
Prefabricated duct work and fittings, aluminum water heaters, blow torches and firepots.

648 **Cleaver-Brooks Co., Boiler Div., Milwaukee, Wis.**
650
N-331 **Cleaver-Brooks Co., Burner Div., Milwaukee, Wis.**

232 **Cobra Metal Hose Div., DK Mfg. Co., Chicago, Ill.**
Flexible metal hose connectors and liquid oxygen transfer hose.

236 **The Coleman Co., Inc., Wichita, Kan.**
238 Gas water heaters, oil and gas furnaces, gas wall heaters,
242 remote air conditioning package, upright and bonnet cooling units, and air-cooled condenser.

1259 **Columbia Burner Co., Toledo, Ohio.**
Oil and gas furnaces, air conditioning, and gas conversion burners.

1238 **Combustion Control Div., The Electronic Corporation of America, Boston, Mass.**

1124 **Commercial Filters Corp., Melrose, Mass.**
1126

1006 **Committee on Steel Pipe Research, American Iron and Steel Institute, New York, N. Y.**
Uses for steel pipe for heating and cooling.

1214 **Conco Engineering Works, Heating & Air Conditioning Div., H. D. Conkey & Co., Mendota, Ill.**
Year-round heating and air conditioning unit; oil and gas fired heating equipment, and air and water-cooled air conditioning equipment.

221 **Condensation Engineering Corp., Chicago, Ill.**
Prefabricated chimneys and chimney lining pipe.

142 **Connor Engineering Corp., Danbury, Conn.**
Commercial, industrial, and residential diffusers, high-pressure and air improving equipment.

1133 **Continental Air Filters, Inc., Louisville, Ky.**
Air filters.

112 **Loren Cook Co., Berea, Ohio.**
Spun aluminum roof ventilators.

1220 **Copeland Refrigeration Corp., Sidney, Ohio.**
1224 Motor-compressors and condensing units, belt-driven compressors.

114 **The Corley Co., Inc., Plainville, Conn.**
Industrial pumps, unions, and fittings.

N-217 **Cormark Distributors, Chicago, Ill.**

33 **Crane Co., Chicago, Ill.**
37 Hot water and warm air heating equipment, and air conditioning systems.

1008 **Crise Controls Div., The Acro Mfg. Co., Columbus, Ohio.**

748 **Curtis Mfg. Co., Refrigeration Div., St. Louis, Mo.**
750 Packaged air conditioners and liquid chillers, and con-
849 densing units.
851

N-237 **Custom Industries Mfg., Inc., Warren, Ohio.**

740 **Cutler-Hammer, Inc., Milwaukee, Wis.**
Refrigeration control, magnetic starters, manual starters, safety switches, pushbutton units and stations, and allied electrical equipment.

551 **Cyclotherm Div., National-U. S. Radiator Corp., Oswego, N. Y.**

1116 **Davidson Fan Co., Newton, Mass.**
Roof fans.

239 **DeBothezat Fans Div., American Machine and Metals, Inc.,**
243 **East Moline, Ill.**
Roof ventilators, bifurcators, and fan wheels.

1217 **Delavan Mfg. Co., West Des Moines, Iowa.**
Oil burner nozzles and accessories, nozzle display racks, tool, and boxes, kits, industrial nozzles.

1216 **Delco Products Div., General Motors Corp., Dayton, Ohio.**
Electric motors and electrical controllers.

950 **Delta Heating Corp., Trenton, N. J.**

21 **Detroit Controls Corp., Detroit, Mich.**
220

433 **Diehl Mfg. Co., Somerville, N. J.**
Electric motors and industrial type fans.

530 **Dielectric Products Co., Jersey City, N. J.**

N-332 **Di Machine Corp., Chicago, Ill.**
Automatic presses and fin dies.

201 **F. W. Dodge Corp., New York, N. Y.**

561 **Doerr Electric Corp., Cedarburg, Wis.**
Motors for air conditioning, heating, and ventilating.

233 **Dole Refrigerating Co., Chicago, Ill.**
Ice accumulator unit.

725 **The Dole Valve Co., Chicago, Ill.**
727 Air and vacuum valves, flow controls, water mixers, relief valves, and automatic registers.

518 **Domestic Engineering Co., Chicago, Ill.**
520

N-408 **Dongan Electric Mfg. Co., Detroit, Mich.**
Ignition transformers for oil and gas burners, and boost—buck transformers.

N-343 **Dover Mfg. Co., Independence, Mo.**
Induced and natural-draft water cooling towers.

N-436 **Downing Steel Products Co., Dayton, Ohio.**
Gas conversion burner.

739 **Doyle Vacuum Cleaner Co., Grand Rapids, Mich.**
Vacuum cleaners and attachments for furnace, air conditioning, and boiler cleaning.

867 **Dravo Corp., Pittsburgh, Pa.**
869 Counterflo heaters with induced draft burner.

811 **Drayer-Hanson, Division of National-U. S. Radiator Corp., Los Angeles, Calif.**
Evaporative condenser, air conditioning units, air-cooled water chiller and air handling unit.

N-417 **Dreis & Krump Mfg. Co., Chicago, Ill.**
Press brakes.

566 **Dryer Electric Co., Brooklyn, N. Y.**

208 **Dryomatic Corp., Alexandria, Va.**
Commercial, industrial, and household dehumidifiers.

910 **Dunham-Bush, Inc., West Hartford, Conn.**
1244 Air conditioning units and equipment; heating controls,
1248 water chillers, and heat exchangers.
1250

N-242 **E. I. du Pont de Nemours & Co., Wilmington, Del.**
Refrigerants.

234 **Durant Insulated Pipe Co., East Palo Alto, Calif.**
Presealed and prefabricated insulated pipe.

540 **Duro Dyne Corp., New Hyde Park, N. Y.**
542 Blade kit, vane rail, dampers, damper regulators and quadrants, file and solder iron handles, portable spot welder, metal hand punches, and New: insulation adhesives for attaching insulation to ductwork.

1010 **F. W. Dwyer Mfg. Co., Michigan City, Ind.**
Draft gages, manometers, carbon di-oxide indicators, air filter gages, pitot tubes, and air velocity kits.

637 **Eckhart Mfg. Co., Inc., Union, N. J.**
Oil burners, and carbon and soot eliminator.

1028 **Eddington Metal Specialty Co., Eddington, Pa.**
1030

966 **Edwards Engineering Corp., Pompton Plains, N. J.**

972 **Ejay Baseboard Mfg. Co., Winstead, Conn.**
Baseboard, and remote heat and cool unit.

702 **Electro-Air Cleaner Co., Pittsburgh, Pa.**
Air cleaning units.

872 **Elgen Mfg. Corp., Long Island City, N. Y.**
874

N-325 **Embassy Steel Products, Inc., Brooklyn, N. Y.**
Convectors, steel boilers, baseboard radiation, fin tube, through-the-wall air conditioner and convector units, fin surfaces.

1261 **Emerson Electric Mfg. Co., St. Louis, Mo.**
1263
1265
1267

446 **Empire Chemical Products Co., Newark, N. J.**

101 **Engel Sheet Metal Equipment, Inc., St. Louis, Mo.**
102 Sheet metal equipment.

N-235 **Equipco, Inc., Portland, Ore.**
Boiler, and radiation equipment.

333 **The George Evans Corp., Moline, Ill.**
335 Filters, and extruded aluminum frame.

631 **The Excelsior Steel Furnace Co., Chicago, Ill.**
Air distribution equipment.

506 **Farr Company, El Segundo, Calif.**
Air filtration equipment.

736 **Fasco Industries, Inc., Rochester, N. Y.**

914 **Fedders-Quigan Corp., Trenton, N. J.**
Unit heaters, convectors, baseboard, remote heating and cooling units, and self-contained cooling units.

11 **Federal Boiler Co., Inc., Midland Park, N. J.**
Boilers and baseboard.

108 **Fee & Mason Mfg. Co., Inc., Manasquan, N. J.**
Pipe suspension equipment and accessories.

554 **Field Control Div., H. D. Conkey & Company, Mendota, Ill.**
Draft controls for oil, coal and gas-fired heating equipment.

138 **Finn & Co., Inc., Hawthorne, N. J.**

N-302 **Flexible Tubing Corp., Guilford, Conn.**
Flexible ducting.

1107 **Flexonics Corp., Maywood, Ill.**
Flexible hoses, vibration absorbers, and expansion joints.

1042 **The Forest City Foundries Co., Niagara Furnace Div.,**
1044 **Cleveland, Ohio.**
Gas and oil fired warm air furnaces, and residential air conditioning equipment.

N-226 **Fraser & Johnson Co., San Francisco, Calif.**
N-228 Gas heating furnaces, evaporator coils, and air conditioners.

207 **Freeman Heating Div., Illinois Iron & Bolt Co., Carpentersville, Ill.**
Stokers, gas and oil furnaces, gas incinerator, conversion gas burner, and stoker loader.

1017 **Frick Company, Waynesboro, Pa.**
Compressors, air conditioners, evaporative condensers.

29 **Frigidaire Div., General Motors Corp., Dayton, Ohio.**
Gas and oil fired furnaces, air conditioners, and condensing units.

1050 **Fulton-Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.**

231 **Furnas Electric Co., Batavia, Ill.**
Electric motor controls.

317 **The Gallaher Co., Omaha, Neb.**

1162 **The Russell R. Gannon Co., Inc., Cincinnati, Ohio.**
1164

324 **General Air Conditioning Corp., Los Angeles, Calif.**
Heating and cooling air conditioners, and heat pumps.

632 **General Blower Co., Morton Grove, Ill.**
Centrifugal fans and blowers.

147 **General Chemical Div., Allied Chemical & Dye Corp., New York, N. Y.**
Fluorinated hydrocarbon refrigerants.

714 **General Controls Co., Glendale, Calif.**
Automatic controls for heating and air conditioning.

N-435 **General Dynamics Corp., Electro Dynamic Div., Bayonne, N. J.**
A-c electric motors.

39 **General Electric Co., Apparatus Sales Div., Schenectady, N. Y.**

932 **General Electric Co., Commercial and Industrial Air Conditioning Dept., Bloomfield, N. J.**

916 **General Filters, Inc., Novi, Mich.**
Fuel oil filters, soot remover, humidifiers.

1104 **General Plate Div., Metals & Controls Corp., Attleboro, Mass.**

N-544 **General Products Co., Inc., Fredericksburg, Va.**
Packaged chimneys.

1269 **General Register Corp., Cedar Grove, N. J.**
Registers and grilles.

611 **Gerwin Industries, Inc., Thermo-Base Div., Michigan City, Ind.**
Extended baseboard air distributors.

210 **Gibson Refrigerator Co., Div. of Hupp Corp., Greenville,**
212 **Mich.**
214

833 **E. D. Goodfellow Co., Inc., Memphis, Tenn.**
Induced draft cooling towers, and centrifugal pumps.

444 **The Goodyear Tire and Rubber Co., Inc., Akron, Ohio.**
Electrostatic air filter.

54 **Gordon & Piatt, Inc., Winfield, Kan.**

728 **Goulds Pumps, Inc., Seneca Falls, N. Y.**

N-306 **Governair Corp., Oklahoma City, Okla.**
N-405

1243 **The Green Fuel Economizer Co., Inc., Beacon, N. Y.**
1245 Automatic air filter.

732 **Grinnell Co., Inc., Providence, R. I.**

729 **Gustin-Bacon Mfg. Co., Kansas City, Mo.**
731 Duct and pipe insulation.

1049 **Hall-Neal Furnace Co., Indianapolis, Ind**
Heating and air conditioning equipment.

1002 **Halstead & Mitchell, Pittsburgh, Pa.**
Cooling towers, air and water cooled condensers, heating and cooling coils.

N-217J. **H. Hamlin Co., Inc.,**
Concrete hole saw, drill saw attachment, and concrete hand drill.

1062 **Arthur Harris & Co., Chicago, Ill.**
Floats.

1132 **Hart & Cooley Mfg. Co., Holland, Mich.**
Registers, grilles and diffusers.

N-401 **Hart Heat Div., Avery Farm Machinery Corp., Peoria, Ill.**
Oil burners, and warm air furnaces.

507 **Hastings Air Control, Inc., Omaha, Neb.**
Air conditioning equipment, unit heaters, burners, and portable hoist.

948 **Heating Publishers, Inc., New York, N. Y.**

336 **Heat-Timer Corp., New York, N. Y.**
338

1117 **The Heil Co., Milwaukee, Wis.**
1121 Furnaces and boilers, conversion units, and air condition-
1125 ers.

933 **The Henry Furnace Co., Medina, Ohio.**
Furnaces, air conditioners, prefabricated piping.

N-440 **Henry Valve Co., Melrose Park, Ill.**
Valves, driers, strainers and accessories.

435 **Herbster Furnace Co., Cleveland, Ohio.**

719 **Hi-Flow Products, Inc., Hidden Heat, Inc., Copiaque, L. I., N. Y.**
Oil and gas burner, hot water heating furnace, radiant panels and accessories, manifolds.

N-402 **Hilti Rapid Fastening Systems, Inc., New York, N. Y.**
Hammer actuated drive tools.

772 **Hydrotherm, Inc., Northvale, N. J.**
Gas-fired hot water heating equipment.

1037 **Ilg Electric Ventilating Co., Chicago, Ill.**
1041 Fans, unit heaters, and power roof ventilators.

974 **Illinois Testing Laboratories, Inc., Chicago, Ill.**
1073 Pyrometers, velometers, dew point indicators.

1272 **The Imperial Brass Mfg. Co., Chicago, Ill.**
Tube fittings, tube cutters, flaring tools, benders, pressure hose and couplings, and valves.

N-420 **Independent Blade Co., East Haven, Conn.**
Saw blades.

437 **The Independent Register Co., Cleveland, Ohio.**
Registers and grilles.

N-411 **Industrial Acoustics Co., Inc., New York, N. Y.**
Duct silencer.

1016 **The Industrial Press, New York, N. Y.**
1018 Technical books and magazines.

741 **Industrial Publishing Group, Cleveland, Ohio.**

658 **Ingersoll Conditioned Air Div., Borg-Warner Corp., Kala-**
662 **mazoo, Mich.**
666 Air conditioner, furnaces, condenser, compressor, and electronic filter.

1255 **Ingersoll-Rand Co., New York, N. Y.**
1257 Centrifugal pumps.

N-412 **Insto-Gas Corp., Detroit, Mich.**
Torches and furnaces, soldering iron heaters, salamanders, and infra-red heaters.

N-406 **Insul-Lyte Corp., Div. of Plibrico Co., River Rouge, Mich.**
Combustion chambers, baffles, and commercial and domestic refractories.

N-201 **International Business Machines Corp., New York, N. Y.**

28 **International Heater Co., Utica, N. Y.**
Oil and gas fired heating equipment, home and commercial cooling equipment.

1054 **International Mfg. Co., Air Conditioning Div., Oklahoma**
1056 **City, Okla.**
Chilled and hot water remote type units.

224 **Iron Fireman Mfg. Co., Cleveland, Ohio.**
Oil, gas, and combination burners.

235 **Jackes-Evans Mfg. Co., St. Louis, Mo.**
Solenoid valves.

846 **Jackson and Church, Furnace Div., Saginaw, Mich.**
850 Gas- and oil-fired suspension equipment, gas, oil, and dual fuel direct-fired unit heaters and floor furnaces.

749 **Jefferson Electric Co., Bellwood, Ill.**
Ignition transformers.

1230 **Jenkins Bros., New York, N. Y.**
Valves.

928 **Jenn Air Products Co., Inc., Indianapolis, Ind**
Power roof and wall exhausters.

533 **Johns-Manville Sales Corp., New York, N. Y.**
Fiber insulation, air duct, and home insulation.

643 **S. T. Johnson Co., Bridgeport, Pa.**
645
647

616 **Johnson Service Co., Milwaukee, Wis.**
620
624

510 **Joy Mfg. Co., Pittsburgh, Pa.**
514 Industrial fans, portable ventilation set, and custom industrial fans for special ventilating problems.

1067 **Kaiser Aluminum & Chemical Corp., Oakland, Calif.**

546 **E. B. Kaiser Co., Glenview, Ill.**
548 Prefabricated piping systems, heat exchangers, and tank suction heaters.

606 **Kaustine Furnace & Tank Corp., Perry, N. Y.**

924—**Keeney Publishing Co., Chicago, Ill.**

716 **Kennard Corporation, St. Louis, Mo.**
720 Cooling towers, liquid chillers, coils, and air conditioning blower unit.

1155 **Kinney Mfg. Div., The New York Air Brake Co., Boston,**
1159 **Mass.**
High-vacuum pumps, mass spectrometer leak detector, portable service stations for dehydrating and charging Freon, and high-vacuum valves.

1122 **Koch Engineering Co., Inc., Wichita, Kan.**
Forced draft cooling towers.

640 **Kody Blower Co., Trenton, N. J.**

644 Tube-axial, powdered roof, and bifurcated fans, venturi orifice fans, ventilating heaters, and industrial material handling fans.

42 **The Korfund Co., Inc., Long Island City, N. Y.**
Vibration elimination mounts.

107 **Kritzer Radiant Coils, Inc., Chicago, Ill.**
109 Baseboards, fin tubes, convectors, and unit heaters.

308 **Krueger Air Conditioning Co., Tucson, Ariz.**
Registers and grilles.

N-216 **Lake Chemical Co., Chicago, Ill.**
N-220

836 **The Lau Blower Co., Dayton, Ohio.**
Blowers, blower wheels, pulleys, belts, bearings, and registers.

110 **Lawler Automatic Controls, Inc., Mt. Vernon, N. Y.**
Thermostatic control valves, and temperature regulators.

N-334 **Lennox Industries, Inc., Des Moines, Iowa.**
N-336 Industrial and commercial heating and ventilating equipment.

225 **Leslie Co., Lyndhurst, N. J.**
Pressure regulators and controllers.

106 **Lewin-Mathes Co., St. Louis, Mo.**
Seamless copper and brass tube, and brass rod.

633 **Libbey-Owens-Ford Glass Co., Toledo, Ohio.**
Thermal glass.

316 **The Lima Register Co., Lima, Ohio.**
Diffusers, registers and grilles for heating and air conditioning.

1233 **The Lockformer Co., Chicago, Ill.**
Cleat machine, lockformer, slitter, flanger, and edger.

1120 **L. O. F. Glass Fibers Co., Toledo, Ohio.**

N-317 **Lonergan Mfg. Div., McGraw Electric Co., Albion, Mich.**
Air conditioning units.

N-504 **Magic Aire Div., United Electric Co., Wichita Falls, Tex.**

1154 **Magnetrol, Inc., Chicago, Ill.**
Boiler water level controls, flow switches, and refrigeration control.

216 **Maid-O'-Mist, Inc., Chicago, Ill.**
Warm air, hot water, steam and spray humidifiers, float and expansion type hot water heating system air eliminators, angle balancing valve adapter, and steam boiler water level controls.

326 **Major Controls Co., Corona, Calif.**
Gas appliance pressure regulators and manual shutoff valves.

911 **The Mammoth Furnace Co., Minneapolis, Minn.**
Direct-fired heaters.

414 **Manville Boiler Co., New York, N. Y.**

762 **Marathon Electric Mfg. Corp., Wausau, Wis.**
Fractional and integral-hp motors.

N-330 **March Mfg. Co., Skokie, Ill.**

815 **The Marley Co., Kansas City, Mo.**
Cooling towers, and mechanical equipment for cooling towers.

1207 **Mario Coil Co., St. Louis, Mo.**
Air cooled condensers and evaporative coils for heat pump applications, remote type units, spray type dehumidifiers, horizontal and vertical air conditioning units, heating and ventilating units.

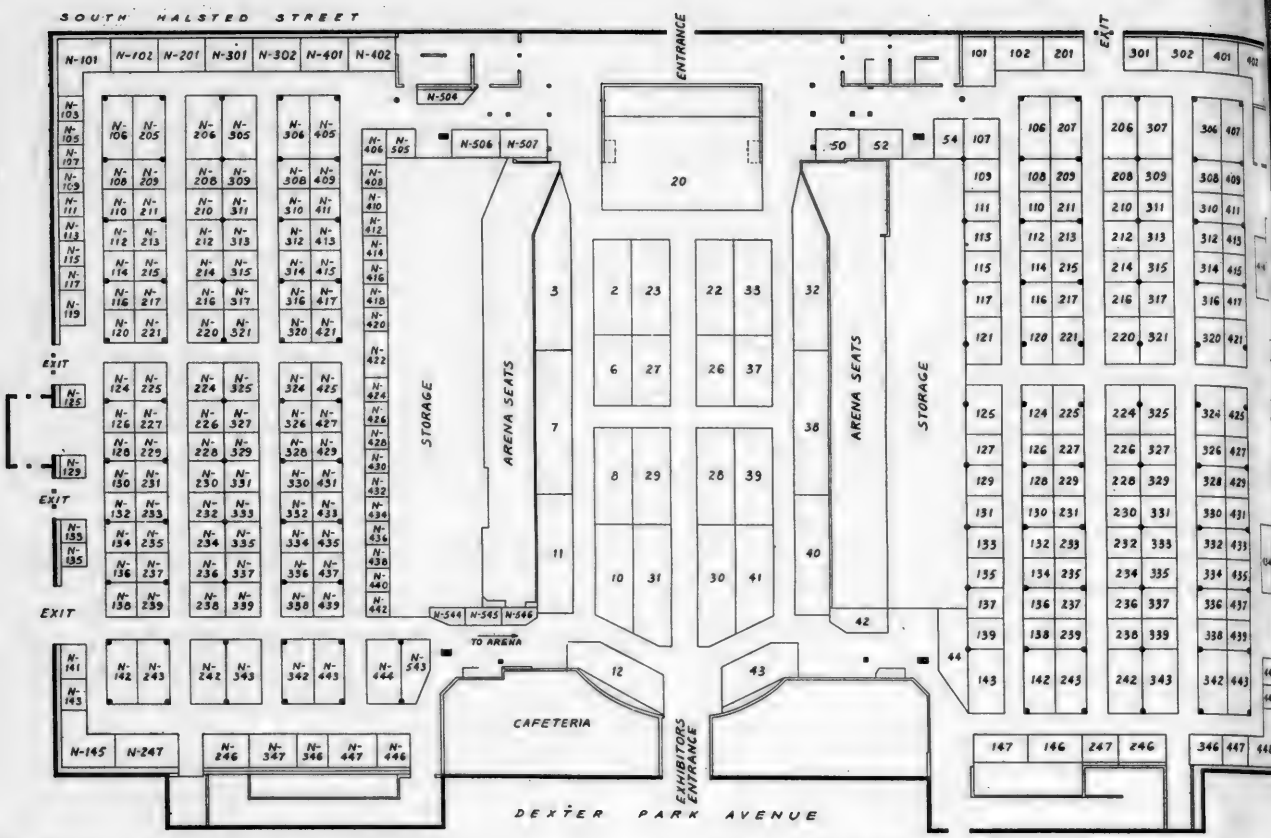
525 **Marsh Heating Equipment Co., Skokie, Ill.**
Serviceman testing gages, heating specialties, refrigeration and air conditioning gages, valves, thermometers, solenoid valves, high-pressure, steel needle valves.

562 **Master Bilt Refrigeration Mfg. Co., St. Louis, Mo.**

321 **Maxitrol Co., Detroit, Mich.**
Gas appliance pressure regulators.

1000 **McDonnell & Miller, Inc., Chicago, Ill.**
Boiler water feeders, low water cut-offs, pump controllers, receiver tank feeders, pressure relief valves, temperature relief valves, float-operated switches, float-operated valves, and flow switches.

N-431 **McIntyre Engineering Co., Inc., South San Francisco, Calif.**
Hot water heating boiler, swimming pool boiler, and U. S. Navy standard unit cooler.



31 McQuay, Inc., Minneapolis, Minn.
Cabinet unit heaters, multi-zone units, residential cooling coils, air-cooled condenser, and tube coils.

536 The Mercoid Corp., Chicago, Ill.
Mercury switch-equipped controls for pressure, temperature, liquid level.

1104 Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Thermostats, motor protectors, relays, controls, switches.

120 Mid-Continent Metal Products Co., Chicago, Ill.

1118 Miller Valve Co., Inc., Pittsburgh, Pa.
Shock-proof check valves.

215 Milwaukee Electric Tool Corp., Milwaukee, Wis.
Right angle drive for tight spot drilling, saws, and Pittsburgh lock hammer.

864 Milwaukee Gas Specialty Co., Milwaukee, Wis.
Space heater control, magnetic-regulator valve, and magnetic-diaphragm valve.

566 Milwaukee Valve Co., Subsidiary of Controls Company of America, Milwaukee, Wis.
Brass valves.

917 Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Residential air conditioning and heating controls, double-duct air blender valve, supervisory data center control panel, electronic air cleaner, and electric, pneumatic, and electronic controls for commercial and industrial buildings.

754 Mitchell Mfg. Co., Milwaukee, Wis.
Residential and commercial air conditioning equipment.

854 Modine Mfg. Co., Racine, Wis.
Unit heaters for use with steam, hot water and gas; convector radiators, air conditioners, cabinet units, and gas duct furnaces.

1136 Monarch Mfg. Works, Inc., Philadelphia, Pa.
Oil burner nozzles and accessories, water spray nozzles, corrosion-resistant sprays.

N-444 The Moore Co., Kansas City, Mo.
N-543 Ventilating fans, vaneaxial pressure blowers, and cooling tower fans.

936 Morrison Products, Inc., Cleveland, Ohio.
Assemblies and component parts of belt drive and direct-connected blowers.

610 Morrison Steel Products, Inc., Buffalo, N. Y.

614 Warm air furnaces, water and air-cooled residential air-conditioning units, small commercial cooling equipment, and multi-room packaged air-cooled unit.

721 Paul S. Morton Engineering Service, Lawrence, Mich.
Btu and area calculators for figuring heat losses by air-change and crackage methods, and withholding tax and electrical heat load calculators.

955 Mueller Climatrol, Milwaukee, Wis.
965 Heating and summer air conditioning equipment.
969

211 Muellermist Irrigation Co., Fanjet Div., Maywood, Ill.
Evaporative-type roof cooling system.

1058 Multi-Vent Div., The Pyle-National Co., Chicago, Ill.
1060 Air diffusers, mult-vent, combination lighting fixture and air diffuser, and multi-vent troffer.

230 The F. E. Myers & Bro. Co., Ashland, Ohio.
Cooling tower centrifugal pumps.

N-342 Mystik Adhesive Products Div., Chicago Show Printing Co., Chicago, Ill.

1137 National Heater Co., Inc., St. Paul, Minn.
Direct-fired, suspended units duct, and counter-flow heaters.

549 National-U. S. Radiator Corp., Johnstown, Pa.
551 Gas boiler; oil heating units, cast iron and steel; all-fuels
802 boilers, cast iron; home heating units; commercial steel
803 boilers; scotch marine boilers; cast iron and non-ferrous
810 baseboard, cast iron and non-ferrous convectors; cast iron
811 radiator; fintube radiation and air conditioning equipment for residential and commercial use.

N-210 New Castle Products, Inc., New Castle, Ind.

325 The New York Blower Co., Chicago, Ill.
327

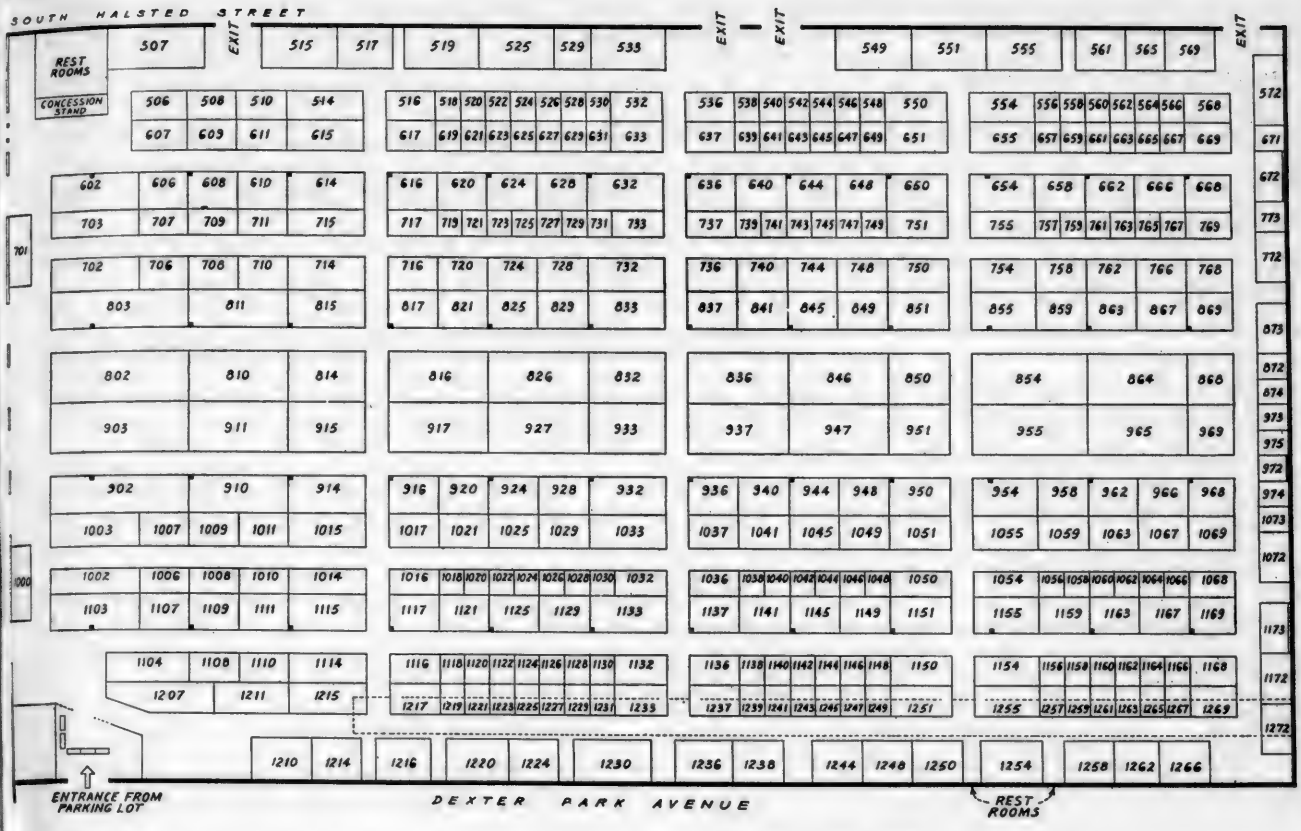
8 Niagara Blower Co., New York, N. Y.
Space coolers, air conditioner, and high-pressure steam fan heater.

1109 Niagara Machine & Tool Works, Buffalo, N. Y.
1111 Slip rolls, rotary machines, bar folders, lever punch and shear, squaring shears, universal grooving machine, hand tools, and foot brake.

N-231 Norman Products Co., Columbus, Ohio.
N-233 Unit heater, horizontal furnace, conversion burners, and duct furnace.

1237 Nye Tool Co., Chicago, Ill.
Pipe tools.

N-309 Olin Mathieson Chemical Corp., Metals Div., East Alton, Ill.



832 **The C. A. Olsen Mfg. Co., Elyria, Ohio.**
Furnaces, air conditioners, prefabricated piping.

N-328 **Omark Industries, Div. of Oregon Saw Chain Corp., Portland, Ore.**
Power-actuated and hammer drive tools.

10 **Orr & Sembower, Inc., Reading, Pa.**
Packaged automatic boilers, and fuel burning systems.

217 **Owens-Corning Fiberglas Corp., Toledo, Ohio.**

544 **Paragon Electric Co., Two Rivers, Wis.**
Automatic time controls.

859 **The Patterson-Kelley Co., Inc., East Stroudsburg, Pa.**
Internal fin chiller, copper-lined storage water heater, and instantaneous heat exchanger.

845 **J. V. Patton Co., Sycamore, Ill.**

555 **Peerless Corp., Indianapolis, Ind.**
Oil and gas furnaces, air conditioners, heat pump.

607 **The Peerless Electric Co., Warren, Ohio.**
Fans, blowers, and ventilating equipment.

751 **Peerless of America, Inc., Chicago, Ill.**
Air conditioning coils, heating and cooling coils, fan blower coils for heating and cooling.

1219 **Peerless Pump Div., Food Machinery and Chemical Corp., Indinapolis, Ind.**

1025 **Penn Controls, Inc., Goshen, Ind.**
Automatic controls for heating, air conditioning, and cooling.

128 **Pennsylvania Furnace & Iron Co., Warren, Pa.**
130 Gas boilers, forced-air furnace, gravity furnace, and conversion burners.

1149 **Pefection Industries Div., Hupp Corp., Cleveland, Ohio.**
1151

N-418 **The Perolin Co., Inc., Chicago, Ill.**
Water treatment crystals, algae preventative briquettes, dry acid cleaner, fuel oil treatment.

125 **Petro, Cleveland, Ohio.**
Commercial-industrial oil and combination oil-gas burners, packaged hot water heating boiler.

N-421 **Phillips Drill Co., Michigan City, Ind.**
Self-drilling expansion shells, and motor hammer.

1247 **Pittsburgh Plate Glass Co., Fiber Glass Div., Pittsburgh,**
1249 **Pa.**

411 **Plumbing & Heating Publishing Co., New York, N. Y.**

N-211 **Portable Electric Tools, Inc., Chicago, Ill.**

314 **Potter & Brumfield, Inc., Princeton, Ind.**

N-328 **Powder Tool Sales Co., Chicago, Ill.**

744 **Powerline Fan Co., Div. of Chelsea Products, Inc., Plainfield, N. J.**
Industrial fans, blowers, ventilation equipment, and accessories.

944 **The Powers Regulator Co., Skokie, Ill.**
1045 Packless radiator valve, heating-cooling thermostat, diaphragm valves, and motors.

52 **Prat-Daniel Corp., Thermobloc Div., South Norwalk, Conn.**

N-311 **Premier Furnace Co., Dowagiac, Mich.**
Warm air heating and air conditioning equipment and fan-air baseboard diffusers.

N-433 **Price & Rutzebeck, Hayward, Calif.**

768 **Primor Products Div., Borg-Warner Corp., Adrian, Mich.**
Central air conditioning systems, water-cooled and air-cooled hermetics, air-cooled and water-cooled condensing units, evaporators, and water chillers.

N-343 **J. F. Pritchard and Company of California, Kansas City, Mo.**
Cooling tower.

127 **Frank Prox Co., Inc., Terre Haute, Ind.**
Mural of installation of cast iron sectional heating boilers.

973 **Pullman Vacuum Cleaner Corp., Boston, Mass.**
Furnace vacuum cleaner and filter bag.

N-413 **Quality Specialty Co., Inc., Camden, New Jersey.**
Control valves, purge and balancing valves, automatic air vents, vacuum breaker and tank drain.

717 **Quickdraft Co., Canton, Ohio.**

247 **The Quincy Stove Mfg. Co., Quincy, Ill.**
Line of forced air furnaces.

1038 **R. C. S. Tool Corp., Bloomington, Ill.**
Portable power saws for roughing in work.

N-505 **Radex Corp., Chicago, Ill.**
Electrostatic precipitators, air cleaners with activated carbon, and office circulator.

N-214 **Radiant-Aire, Div., The Quincy Stove Mfg. Co., Quincy, Ill.**

1128 **Radiant Utilities Corp., Brooklyn, N. Y.**
1130 Oil burners, water heaters, sump pumps, laundry tray pumps.

N-208 **Radio Corp. of America, Commercial Electronic Products, Camden, N. J.**

N-447 **Ramset Fastening System, Winchester-Western Div., Olin Mathieson Chemical Corp.**
Powder-actuated fastening system, and Shure-Set, hammer-in fastening system.

N-347 **Ranco, Inc., Columbus, Ohio.**
Commercial pressure and temperature controls and automatic valves.

310 **Randall Graphite Bearings, Inc., Lima, Ohio.**
Bronze sleeve bearings, pillow blocks, and bearing assembly.

1145 **The Ready-Power Co., Power Plant Div., Detroit, Mich.**
Natural gas engine driven compressor air conditioning unit.

N-506 **Recold Corp. (Refrigeration Engineering, Inc.), Los**
N-507 **Angeles, Calif.**
Multi-zone air conditioner, evaporative condenser, and coils.

1068 **Redmond Company, Inc., Owosso, Mich.**
Fractional horsepower electric motors, and blowers.

229 **Reflectal Corp., Subsidiary of Borg-Warner Corp., Chicago, Ill.**
Sun-shading device.

N-422 **Refrigeration Appliances, Inc., Chicago, Ill.**
Air cooled condensers, air handling units, remote type residential air conditioning coils.

N-213 **Reliance Electric and Engineering Co., Cleveland, Ohio.**
N-215 Motors and motor pulley.

1024 **Research Products Corp., Madison, Wis.**
1026 Air filters, electrically-operated humidifiers, and paint arrestors.

116 **Revcor, Inc., Carpentersville, Ill.**
Blower wheels and blower wheel housings.

826 **Rheem Mfg. Co., Chicago, Ill.**
Warm air furnaces, residential and commercial air conditioning equipment.

307 **Richmond Plumbing Fixtures Div., Rheem Mfg. Co., Metuchen, N. J.**
Boilers, warm air conditioners, and central summer cooling units.

508 **Ric-Wil, Inc., Barberton, Ohio.**
Prefabricated insulated piping systems.

665 **The Ridge Tool Co., Elyria, Ohio.**
667 Pipe wrenches, cutters, threaders, reamers, vises, and sup-
669 ports; nipple chucks; extractors; cutting oils; drive shafts; and threading machines.

1269 **Rite Engineering & Mfg. Corp., Los Angeles, Calif.**
Gas-oil water heating boilers.

1014 **The Rittling Corp., Buffalo, N. Y.**
Baseboard radiation, finned tube, convectors, unit heaters, back draft dampers, combination heating and cooling units, and unit ventilators.

1115 **Roberts-Gordon Appliance Corp., Buffalo, N. Y.**
Conversion burners, furnaces, boilers, unit heaters—all gas; and air conditioners.

1050 **Robertshaw-Fulton Controls Co., Fulton Sylphon Div., Knoxville, Tenn.**
Temperature controls, packless valves, room thermostats, automatic radiator valves, expansion joints, bellows and bellows assemblies.

N-416 **Rotherm Engineering Company, Inc., Chicago, Ill.**
Revolving joints, expansion joints, piping compesators.

569 **Sarco Co., Inc., Sarcotherm Controls, Inc., New York, N. Y.**
Control unit, heating specialties for steam and hot water heating systems, control systems, fin tube and baseboard radiation, condensate and vacuum pumps.

1064 **Schecter Bros. Co., Philadelphia, Pa.**
1066 Galvanized prefabricated duct and fittings, wall stack, fittings, furnace pipe, and adjustable elbows, and warm air perimeter pipe and fittings.

N-430 **Schnacke, Inc., Evansville, Ind.**
Condensing units, water chillers, water cooling towers, and blowers.

124 **Scott-Choate Publishing Co., Inc., Tarrytown, N. Y.**
1239

N-230 **Scully Signal Co., Melrose, Mass.**
N-232 Safety controls for oil burners and diesels.

131 **Sequoia Mfg. Co., San Carlos, Calif.**
Furnaces, air conditioners, and central vacuum systems.

863 **Servel, Inc., Evansville, Ind.**
Water chiller.

1138 **Shana Mfg. Co., Chicago, Ill.**
1140

N-209 **Shaw-Perkins Mfg. Co., W. Pittsburgh, Pa.**
Panel and baseboard radiators, radiator for mental and penal institutions, radiator for industrial use.

743 **Siemon Mfg. Co., Power Flame Div., Grandview, Mo.**
745 Combination gas-oil burners and power gas burners.

N-443 **Silvercraft, Inc., Louisville, Ky.**
Induced draft cooling towers.

529 **Skuttle Mfg. Co., Milford, Mich.**
Humidifiers and filters.

439 **Slant-Fin Radiator Corp., Richmond Hill, N. Y.**
Finned-tube radiators, and residential baseboard radiation.

1108 **A. O. Smith Corp., Permaglas Div., Kankakee, Ill.**
Heating and cooling equipment.

707 **The H. B. Smith Co., Inc., Westfield, Mass.**
Cast iron boilers.

N-320 **"Snappy" Inc., Detroit Lakes, Minn.**
Takeoffs, draw bands, pipe hangers, and hole cutter.

226 **Southwest Mfg. Co., Aurora, Mo.**
228 Gas fired furnaces and air conditioning units.

639 **Spencer Heater, Lycoming Div., Avco Mfg. Co., Williams-**
641 **port, Pa.**

968 **Spi-Rol-Fin Corp., Pequannock, N. J.**
Residential baseboard radiation, steel boiler-burner units, industrial radiation, and through-wall air conditioners.

1254 **Sporlan Valve Co., St. Louis, Mo.**
Thermostatic expansion valve, solenoid valve, refrigerant distributor, and filter drier.

516 **Sprague Electric Co., North Adams, Mass.**
A-c electrolytic capacitors for motor-starting applications, a-c capacitors, motor-start, motor-run capacitor package.

757 **Square D Co., Milwaukee, Wis.**
Controls for pumps, air conditioning and refrigeration, starters, disconnect switches and push-button stations.

N-432 **Standard Refrigeration Co., Chicago, Ill.**
N-434

636 **Standard Stamping and Perforating Co., Chicago, Ill.**
Registers and grilles.

N-442 **Sta-Rite Products, Inc., Delavan, Wis.**
Centrifugal pumps for air conditioning applications.

329 **Wm. Steinen Mfg. Co., Newark, N. J.**
331 Barometric draft regulators, oil burner nozzles, electrode assemblies.

134 **Stephens-Adamson Mfg. Co., Sealmaster Div., Aurora, Ill.**

709 **Sterling Radiator Co., Inc., Westfield, Mass.**

50 **Stewart Mfg. Co., Inc., Cedar Grove, N. J.**
Registers and grilles.

1150 **Stewart-Warner Corp., Heating and Air Conditioning Div.,**
1251 **Lebanon, Ind.**
Heating and air conditioning equipment.

237 **Stoddard Industries, Inc., Chicago, Ill.**
Electrostatic filter.

975 **Strong, Carlisle & Hammond Div., Cleveland, Ohio.**
Steam and vented float traps.

737 **Sundstrand Engineering Co., Rockford, Ill.**
Oil burners.

617 **Sundstrand Hydraulic Div., Sundstrand Machine Tool Co.,**
619 **Rockford, Ill.**
Fuel units, constant speed refrigeration drive.

1221 **Sun-Ray Burner Mfg. Corp., Jamaica, N. Y.**
1223 High pressure gun-type oil burners, fuel oil transfer
1225 pumps.

2 **Surface Combustion Corp., Janitrol Heating & Air Conditioning Div., Columbus, Ohio.**
Year-round conditioners, gas-fired; winter air conditioners, gas- and oil-fired; unit heaters, gas-fired; and conversion burners.

522 **Synchronous Flame, Inc., Walworth, Wis.**
524
526
528

343 **Syncromatic Corp., Watertown, Wis.**
Oil and gas furnaces and air conditioning unit for them.

1021 **Taco Heaters, Inc., Cranston, R. I.**
Circulators, centrifugal pumps, valves, and hot water air vents.

1114 **Tecumseh Products Co., Tecumseh, Mich.**
Hermetic compressors for residential air conditioning.

625 **Temco, Inc., Nashville, Tenn.**
627 Warm air furnaces with combination air conditioning, floor
629 furnaces, heaters—all gas-fired

915 **Thatcher Furnace Co., Garwood, N. J.**
Oil- and gas-fired furnaces, summer cooling units.

N-324 **Thermo-Products, Inc., N. Judson, Ind.**
Oil- and gas-fired furnaces, air conditioning unit, hot water boiler.

1173 **H. A. Thrush & Co., Peru, Ind.**
Hot water heating specialties.

117 **Titus Mfg. Corp., Waterloo, Ia.**
121 Ceiling diffusers, air conditioning registers and grilles.

N-308 **Toridheet Div., Cleveland Steel Products Corp., Cleve-**
N-310 **land, Ohio.**
N-312 Oil burners, oil- and gas-fired furnaces, boiler burner unit, comfort cooling units.

816 **The Torrington Mfg. Co., Torrington, Conn.**
Blower units and fan blades.

3 **The Trane Co., La Crosse, Wis.**
7 Heat transfer surface, reciprocating compressors, centrifugal water chillers, reciprocating water chillers, self-contained air conditioners, remote unit air conditioners, fan-coil room air conditioners, induction type air conditioners, steam specialties, fans, unit heaters, convectors, baseboard, finned radiation, unit ventilators, coils.

765 **H. O. Trerice Co., Detroit, Mich.**
767

124 **Triad Products Corp., Chicago, Ill.**
Baseboard heating system in conjunction with floor coil.

1210 **Trion Inc., McKees Rocks, Pa.**
Electronic air cleaner, traveling oil curtain, mechanical filter panels.

N-429 **The Triplex Heating Specialty Co, Inc., Peru, Ind.**
Circulators, headers for radiant heating, valves, one-pipe fittings (iron and brass), and other miscellaneous hot water heating specialties.

N-221 **Tube Manifold Corp., North Tonawanda, N. Y.**
TMC filter driers and liquid receivers.

N-438 **Tuthill Pump Co., Chicago, Ill.**
Pumps.

654 **Tuttle & Bailey, Div. of Allied Thermal Corp., New Britain, Conn.**
Air conditioning grilles, registers, ceiling diffusers, pressure reducing valves, baseboard.

413 **Typhoon Air Conditioning Co., Div. of Hupp Corp., Brook-**
415 **lyn, N. Y.**
417 Packaged air conditioners, condensing units, water chiller, attic units, furnaces.

306 **Union Electric & Mfg. Co., Jersey City, N. J.**
Ignition transformers.

N-504 **United Electric Co., Chicago, Ill.**
Air conditioning and refrigeration evaporators, condenser coils, air-cooled condensers, evaporative cooling units.

N-229 **United Sheet Metal Co., Inc., Columbus, Ohio.**
Pipe, sheet metal fittings, sound absorbers.

1029 **United States Air Conditioning Corp., Philadelphia, Pa.**
1033 Central Station and packaged air conditioners, chillers, condensing units.

1036 **United States Register Co., Battle Creek, Mich.**
Registers, vents and grilles, back pressure dampers and air conditioning accessories.

1236 **Universal Diffuser Corp., Tuckahoe, N. Y.**
Diffusers and accessories.

609 **Utility Appliance Corp., Los Angeles, Calif.**
Gas-fired furnaces and unit heater, year-round conditioner, evaporative air coolers.

608 **Utility Fan Corp., Div. of Utility Appliance Corp., Calif.**
Blowers and blower parts.

N-437 **Van-Packer Co., Div. of The Flintkote Co., Bettendorf, Ia.**
Chimney, industrial stack, gas vent.

N-409 **Vapor Heating Corp., Chicago, Ill.**
N-405 Heating boiler, space heater.

1229 **Velocity Power Tool Co., Pittsburgh, Pa.**
1231 Portable pipe threader, power stud hammer, soldering and brazing torch.

312 **Ventfabrics, Inc., Chicago 12, Ill.**
Fabrics for flexible connections, damper hardware, insulated access doors.

532 **The Vibration Eliminator Co., Long Island City, N. Y.**
Vibration eliminators.

1156 **Vibration Mountings, Inc., Corona, N. Y.**
Vibration control mountings and materials.

549 **Viking Air Products, Cleveland, Ohio.**
Blowers, humidifiers.

N-321 **The Viter Mfg. Co., Milwaukee, Wis.**
Packaged type liquid cooling unit.

927 **Vulcan Radiator Co., Hartford, Conn.**
Baseboard radiation and registers, ventilator.

1129 **Wagner Electric Corp., St. Louis, Mo.**
Electric motors for heating, ventilating and air conditioning equipment.

920 **Walker Mfg. & Sales Corp., St. Joseph, Mo.**
Draft controls for oil and gas-fired combustion equipment, chimney caps, draft inducers for flue pipe.

672 **William Wallace Co., Metalbestos Div., Belmont, Calif.**
Gas vent pipe and fittings, and gas vent tables.

1227 **Walther Publishing Associates, Inc., New York, N. Y.**

434 **Walton Laboratories, Inc., Irvington 11, N. J.**
Humidifiers, humidstats, humidity indicators.

N-414 **Warren Engineering Co., Broadway, N. J.**
Valves.

706 **Warren Webster & Co., Camden, N. J.**
708 Heating and air conditioning products for residential, com-
710 mercial and institutional fields.

337 **Waterloo Register Co., Inc., Waterloo, Ia.**
Wall registers and grilles.

448 **The Waterman-Waterbury Co., Minneapolis, Minn.**
Year-round air conditioner, central system air conditioners, gas burners, gas and oil-fired residential furnaces.

135 **Watts Regulator Co., Lawrence, Mass.**
Temperature and pressure relief valves, regulators, boiler water level controls.

1169 **Wayne Home Equipment Co., Inc., Fort Wayne, Ind.**
Oil burners.

N-239 **The Weatherhead Co., Ft. Wayne Div., Fort Wayne, Ind.**
Refrigeration valves, Freon hose assemblies, brass fittings, steel receivers, screw machine products.

572 **Webster Electric Co., Racine, Wis.**
Fuel units, ignition transformers.

947 **Weil-McLain Co., Michigan City, Ind.**
951 Boilers, oil heating unit, header, fan coil unit, packaged water chiller, baseboard panels.

1142 **Weil Pump Co., Chicago, Ill.**
1144 Sewage ejectors, sump pumps, condensate pumps, cir-
1146 culating pumps.
1148

002 **Westinghouse Electric Corp., Sturtevant Div., Hyde Park,**
1003 **Mass.**
1007 Fans, air blenders, electronic air cleaners, heating and direct expansion coils.

1103 **Westinghouse Electric Corp., Pittsburgh, Pa.**
Air conditioning and heating units, motors, gearing and electric control for air conditioning.

N-346 **Wheel Trueing Tool Co., Detroit, Mich.**
Drilling machine and equipment, drill motors, drill bits, swivels, water pick-ups.

N-234 **Whirlpool-Seeger Corp., St. Joseph, Mich.**
N-236
N-238

427 **White-Rodgers Co., St. Louis, Mo.**
429 Thermostat, oil burner controls, hot water controls.
431

N-439 **Edwin L. Wiegand & Co., Pittsburgh, Pa.**
Unit ventilators, fan-type recessed wall heaters, convectors, baseboard heaters, heaters, duct-type unit heaters, radiant wall panels.

330—**Williams Div., Eureka Williams Corp., Bloomington, Ill.**
332 Heating and air conditioning equipment.
334

N-426 **Wilson Mfg. Co., Memphis 4, Tennessee**
N-428 Complete line of tubing tools.

538 **Windmaster Div., Lima Register Co., Columbus, Ohio.**
Draft control.

1211 **L. J. Wing Mfg. Co., Linden, N. J.**
Revolving unit heater, fresh air supply heater, gas utility heater, duct fan, draft inducers, blowers, steam turbine.

213 **The Wiremold Co., Hartford, Conn.**
Flexible air duct.

N-327 **Wolverine Tube, Div. of Calumet & Hecla, Inc., Detroit, Mich.**
Finned tubing, capillary tube, aluminum evaporator assembly.

N-206 **John Wood Co., Conshohocken, Pa.**
Oil and gas—conversion burners, furnaces and boilers.

954 **Worthington Corp., Harrison, N. J.**
958 Packaged air conditioners, hermetic centrifugal refrigera-
962 tion unit, 2-stage centrifugal compressor, air handling unit.
1055
1059
1063

628 **The XXth Century Heating & Ventilating Co., Akron, Ohio.**
Gas, oil, and coal-fired cast iron furnaces.

N-425 **Yeats Appliance Dolly Sales Co., Milwaukee 5, Wis.**
Appliance dollies, protective delivery covers.

32 **York Corp., Div. of Borg-Warner Corp., York, Pa.**

50 **York-Shipley, Inc., York, Pa.**

52 Boilers, fuel oil burners.

206 **Young Radiator Co., Racine, Wis.**

724 **Young Regulator Company.**
Damper regulators, accessories, remote controls, registers, grilles and ceiling diffusers.

940 **Zatko Metal Products Co., Euclid, Ohio.**
Stamped steel pulleys and V-belts.

LOUIS BLENDERMANN ON

PIPING AND PLUMBING

Fixtures for Mental Hospitals

NEW hospital construction, including mental hospitals, has increased sharply during the past few years. Many new design innovations have been incorporated in these new structures to keep in step with the tremendous strides being accomplished in medical science and treatment. Mental hospitals, for example, now contain certain refinements that one would expect to find in a rest home rather than a place of confinement.

The individual rooms and wards, as well as the eating and recreation areas, are planned in a manner and with an atmosphere that best suits the speedy rehabilitation of the patients. Plumbing facilities design has also been given a good deal of attention, to the extent, that the fixtures are neat in appearance and serve all the basic functions required. This article will point out some of the new achievements made in the rest rooms of the mental hospitals.

Typical Rest Rooms

A typical rest room for the men patients would be similar to the layout shown in Fig. 1. The women's rest room would be similar to that shown in Fig. 1, with the exception that the urinals are omitted and more lavatories added. The rest room layout is, in general, equal to that designed for a hospital, office building or various other types of structures.

Even the fixtures are similar to those that would be specified for other types of structures. The big difference, of course, is that the fixtures and trim are vandal-proof and cannot be removed or torn loose by the patients. Moreover, all of the necessary piping and valves are concealed to prevent their being tampered with by the patients.

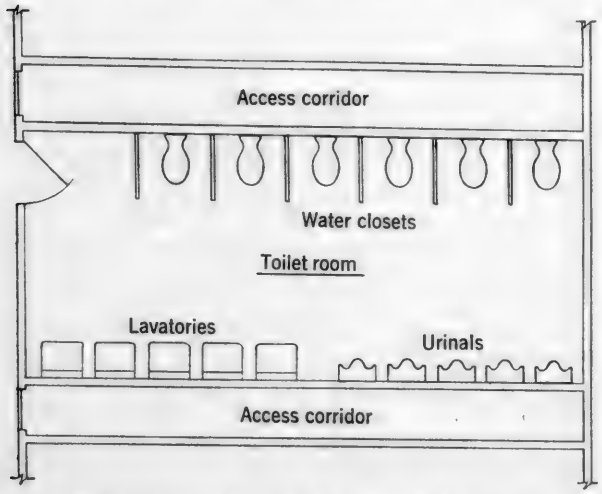


Fig. 1. Typical layout of a men's toilet room.

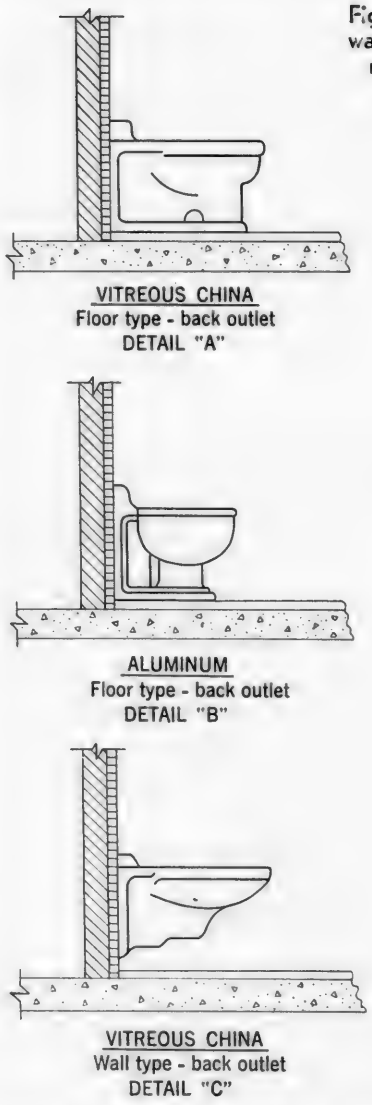


Fig. 2. Three types of water closets used in mental institutions.

Such fixtures are known as institutional type fixtures and are manufactured expressly for such structures. It is of utmost importance that all precautions be taken to provide an installation of fixtures and trim that cannot be worked loose by the patients. Water closets can be equipped with flush valves that are actuated by push button controls. If desired, the flushing of all the closets, as well as urinals, can be accomplished by the attendant, by means of a remote control station.

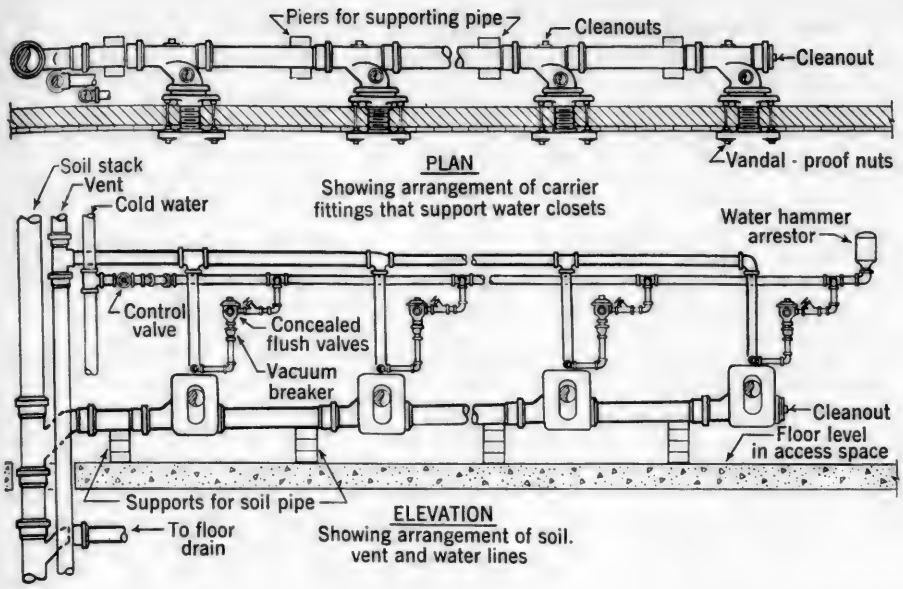


Fig. 3. Plan and elevation showing roughing for wall hung water closets.

Lavatories are of the special type that are rigidly secured to the wall. They are equipped with a tamper-proof spout. Even the trap is an integral part of the fixture and therefore cannot be removed. Hot and cold water is dispensed by means of spring loaded faucets set into the back of the lavatory. Only the pushbutton itself is exposed. The faucets are maintained from the access corridor.

Shower rooms are also given special attention in that the shower heads are vandal-proof and are tightly secured to the wall construction. Shower water is dispensed either by an individual mixing valve at each shower head or is dispensed by the attendant at a remote control station. In either case, nothing hotter than tempered water is furnished to prevent the patients from scalding themselves.

Access corridors are provided behind the batteries of fixtures to permit the proper maintenance and repair of the concealed valves and equipment. A floor drain must be included in the toilet room to intercept any overflow that may be discharged by the fixtures in the event of a stoppage. These are just some of the provisions that are included in the rest rooms of mental hospitals.

Water Closet Facilities

Since the water closets must be vandal-proof, it becomes necessary to select the type of a water closet that will furnish the needed protection. Figure 2 illustrates three of the types of water closets more generally employed for this specific purpose.

The first water closet shown in Detail *A*, Fig. 2, represents a vitreous china, floor type, back outlet water closet. Detail *B*, shows a floor type, back outlet water closet constructed of aluminum or stainless steel. Detail *C*, represents a vitreous china, wall type water closet. All of these closets shown can be furnished as blow-out type or siphon-jet.

Each of the closets illustrated can be successfully used; of equal importance, each one can be installed in a vandal-proof manner. The roughing for such fixtures can be accomplished with either conventional type fittings or with patented type fittings. In those areas where a short piece of lead is required between the fixture and the soil line, this can be done. It is however, most important, that the fixtures be anchored in a rigid manner.

Typical Roughing Arrangement

The water closets and component piping must be carefully installed in order to ensure the proper function of the fixtures and ease in maintenance of controls and equipment. Figure 3 illustrates a typical roughing arrangement for a battery of water closets.

For the purpose of example, the vitreous china, wall type, blow-out water closet was chosen. In addition, cast iron soil pipe and fittings were used only for the sake of example. Galvanized steel or galvanized wrought iron with threaded drainage fittings are just as desirable. The selection of the type of closet to be used and the piping material that will best suit the purpose must be determined by the engineer or is prescribed by the local plumbing code. The hospital authorities also may have some very definite requirements with regard to the fixtures and piping materials to be utilized.

As indicated in Fig. 3, all of the valves and piping are concealed in the access corridor. This corridor should be of sufficient proportions to offer every convenience to the maintenance man in performing the necessary maintenance and repair he will be called on to do.

Every precaution has been taken to prevent and minimize the damage and nuisance that a stoppage can cause. Mental patients often try to flush parts of their clothing down a water closet. This unfortunate occurrence sometimes happens before the attendant can intercede. One or more floor drains are a necessary consideration because of this as the drains intercept any water that may overflow from the fixtures, following a stoppage. Floor drains also simplify the periodic cleaning of these rooms.

To clear the horizontal soil line of a stoppage resulting from clothing or other foreign matter, cleanouts are placed at the end of the run as shown. Cleanouts are often placed in the side of the patented drainage fitting as shown in Fig. 3. This cleanout will permit the easy removal of clothing or other matter that may be lodged in the line between the fixture and the soil line.

Again, for the purpose of example only, a patented

drainage fitting has been used rather than the conventional type of drainage fittings. The patented fittings not only serve as a drainage fitting but they support the wall type water closet. This means of support is ideal because the chair carrier will support the fixture independent of the wall with no strain placed on the wall or finished surface of the wall. Vandal-proof nuts can be furnished by the manufacturer of the patented fittings. Such nuts are used to hold the fixture in place and are of a type that can be installed only with a special tool. This avoids the possibility of removal by the patients.

Figure 4 shows in section how the fixture is supported and the manner in which the roughing is installed in the access corridor.

An access corridor of 30 in. minimum has been suggested. This amount of space will afford sufficient room for the proper maintenance and repair. The door by which entry is gained to the access corridor should be well constructed and equipped with a lock.

Although the blow-out water closet shown operates a little more noisily than does the siphon jet, its flush is more thorough than with the other type of fixture. In sizing the water supply piping, it is well to remember that a blow-out water closet requires about 5 psi more pressure to operate than does the siphon-jet.

Toilet Partitions

The toilet partitions used in the rest rooms are usually selected by the architect or the hospital consultant. These partitions are not generally equipped with doors and are constructed of heavy marble, steel or other durable material. A typical marble partition is featured in Fig. 5. This type partition is securely fastened to both the wall and floor. Although the partition offers sufficient privacy to the patient it will not obstruct, to any great extent, the view for the attendant. It is very important that the attendant be ever aware of the patients' actions at all times.

Urinals

Urinals are given the same consideration as the water closets, with respect to the manner in which they are supported and secured. Flush valves with push button controls are also utilized for these fixtures.

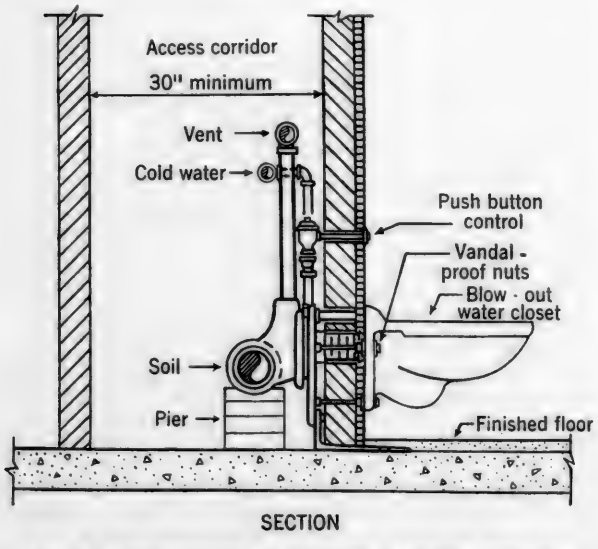


Fig. 4. Arrangement of roughing in access corridor.

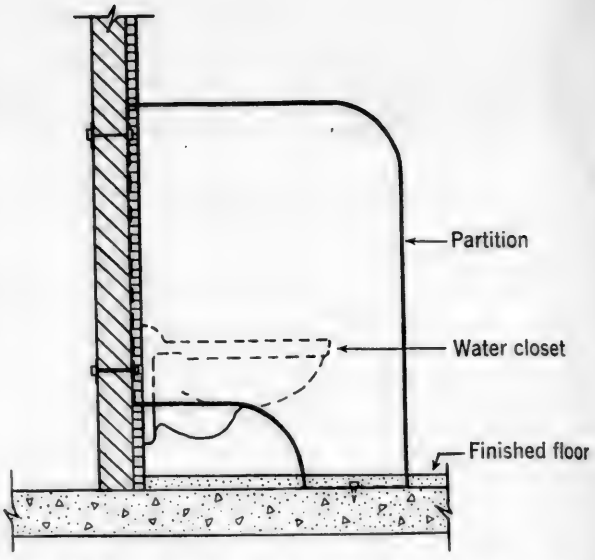


Fig. 5. Suggested type of partition that may be used to separate water closets.

Lavatories

There are several ways in which lavatories may be supported and secured in an adequate manner. One method requires that the lavatories be bolted to the wall construction. Another method is to support and secure the lavatory by means of a patented carrier. The particular method employed is a matter of selection on the part of the engineer. The hot and cold water may be dispensed by spring loaded, vandal-proof faucets that are placed in the back of the lavatory as previously mentioned.

Shower Rooms

Shower rooms also require special consideration for the benefit of the patients. Shower heads should be vandal-proof and the shower water dispensed by either an individual mixing valve at each shower or by a remote mixing valve operated by the attendant. Figure 6 shows how the piping is arranged for a system consisting of a remote mixing valve operated by an attendant.

Here an access cabinet offers an opening to the control valves that are contained within the access corridor. In addition to the control valves, a mixing valve is used to maintain a prescribed water temperature to the showers. The mixing valve assures against scalding the patients should the temperature of the hot water fluctuate or the pressure of the cold water drop momentarily. Soap depressions are built in the tile wall for the convenience of the patients.

Individual Rooms

In those cases where a patient has his own private toilet room, some of the same considerations outlined before, concerning the fixtures and the trim should be followed. These include the rigid securing of the fixtures and the concealment of all piping controls and equipment. Since an access corridor would not be practical in this instance,

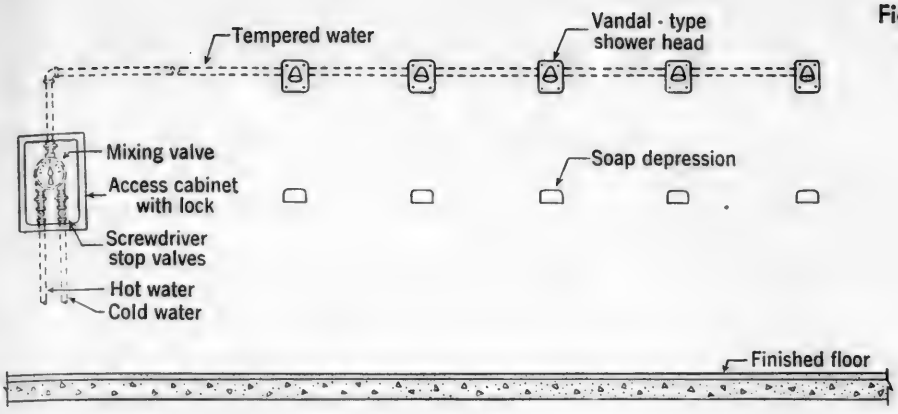


Fig. 6. Suggested arrangement of facilities in a shower room.

an access door might be considered as a means for aiding the maintenance and repair of the concealed controls.

Flush valves should be equipped with push button controls. The lavatory should be equipped with the same type push button faucets described earlier. The lavatory of course is not to be equipped with a pop-up waste or even a stopper. This same condition applies to the battery of lavatories, previously mentioned.

It is also good practice in the private toilet room to include a floor drain to intercept any spillage of water that may overflow out of the fixtures in the event of a stoppage.

Air Pollution in Great Britain from the Use of Fuels

Development of industry in Great Britain has brought with it gross contamination of air. Information on the scope of this problem was covered in a paper on Air Pollution in Great Britain from the Treatment and Use of Fuels, by A. Parker, presented before the Fifth World Power Conference.

In addition to the work on methods of measurement, the Fuel Research Station, Great Britain, undertakes special surveys and investigations of the factors affecting the dispersal of pollutants. For example, over a period of three years, an intensive survey was carried out in and around Leicester with the object of obtaining basic information on the factors influencing the distribution and dispersion of pollution in a city. Since 1945, the staff have undertaken detailed surveys of pollution by sulphur dioxide in several areas in London and elsewhere with the object of providing information on the effects of various factors, including the proximity of large electricity generating stations, and other industrial undertakings burning coal and oil.

In another investigtion undertaken in cooperation with the iron and steel industry, it has been shown that the rate of corrosion of exposed metal increases with increase in the pollution of the air by sulphur dioxide.

Investigations are in progress in cooperation with several medical authorities in an endeavor to ascertain whether there is a correlation between the extent of air pollution and the incidence of such disorders as bronchitis and lung cancer.

During the smog in the London area in December, 1952, the number of deaths was 4000 greater than normal. Arrangements have been made, therefore, for intensive investigations of the extent of pollution during any periods of smog in London and several other large towns during the next two or three years. For this work, special methods of measurement have been devised and a few hundred volunteers have been trained to make measurements in the streets throughout the day and night, in addition to measurements at fixed points.

Detrimental Effects of Pollution

There is no doubt that air pollution has detrimental effects on the health of the community and on agriculture, and that it causes considerable damage to structures and materials of many kinds. There have been several attempts from time to time to estimate the cost in Great Britain resulting from the damage caused in various ways by air pollution. The most recent and reliable estimates so far made are those given in the report of the Committee on Air Pollution published in November, 1954. According to those estimates, which are probably on the low side, the direct costs are in the region of £150 million a year. This figure includes only the extra cost of laundry, painting and decorating, cleaning and depreciation of buildings, corrosion of metals, and damage to textiles and other goods. If the cost of loss of efficiency is added, the Committee estimated the total cost of air pollution to be not less than £250 million a year, and this figure does not include a loss of £25 to £50 million from the imperfect combustion of fuel, which causes much of the pollution.

Abatement of Pollution

In the present state of knowledge and of development of many fuel-burning appliances, it is not practicable entirely to prevent air pollution from the combustion of coals and oils and their products for the generation of heat and power; but it is practicable to effect an appreciable reduction in the pollution by smoke, grit, and carbon monoxide. It is much more difficult to reduce the pollution by oxides of sulphur at reasonable cost.

PRODUCT APPLICATIONS

New, Unusual, or Ingenious Uses of Equipment and Materials

Texas Retailer, Pressed for Room, Utilizes Wide-Open Spaces

PROBLEM: Rising land values in suburban Dallas, Tex., forced the E. M. Kahn & Company store to utilize every possible square inch of floor space for productive purposes. It was necessary to reduce to a minimum the space requirements of the air conditioning apparatus. Design requirements dictated use of 90 tons to maintain 74 deg F inside temperature with outside dry bulb of 102 deg. Building is of one-story, windowless construction, except for display windows, and without basement. It has a floor area of 21,600 sq ft.

SOLUTION: Three package units were placed completely outside the building. Due to the different level between the outside ground and building floor level, foundation pads were built. Return air was tied in directly to the

units through the building wall, eliminating a return-air duct system. Conditioned air is delivered through the store by concealed ducts that discharge through ceiling diffusers.

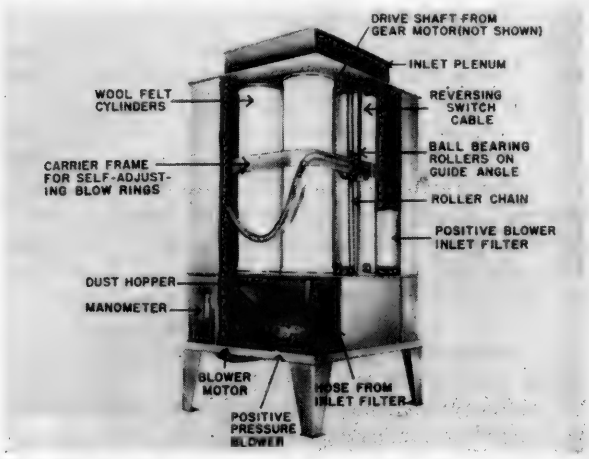
Standard production model 30-hp packages, produced by Alton Mfg. Co., Dallas, required only minor modifications for outside installation. Double insulation was applied to panels exposed to the Texas sun and stainless steel eaves placed above removable panel sections to keep rain or moisture from entering the panel joints. All exposed metal on these models is galvanized and gloss painted for double protection. Duct system into the building is galvanized, internally insulated.

Winter heating is accomplished with a circulating hot water system of 1,200,000-Btu per hr capacity. The 10,800-cfm centrifugal blower on each unit is integral to the heating and cooling system. An evaporative condenser section cools the refrigerant, circulated through a bare copper tube coil. Heavy water sprays and 9,000 cfm of air over the coil assure low head pressures at all times. Condensate water is piped to the condenser tank from where all the water is recirculated.

RESULT: Related to actual sales, space valued at about $15,000 per year is saved, enough to amortize the $40,000 cost for the complete heating-cooling system in 6 or 7 years. During the first year of operation the only maintenance expense has been a $13 a month filter cleaning service charge. Comfortable conditions were maintained throughout the summer of 1956 which included 44 days 100 deg or above and a high of 109 deg. Further, should the store need to expand, it will be a relatively simple matter to shift the equipment back the additional footage required for addition, and add more units if needed.

Ninety Dollars Each Day Went up the Chimney

PROBLEM: A manufacturing chemist in New Jersey, whose product, when damp, was dried in large trays by warm air while the material was slowly agitated to permit the entrapped moisture to escape, was losing $90 worth of material each day up the vent stack. Warm air from the dryer was vented into the atmosphere with a loss of approximately 2.8% of the product.



SOLUTION: A Mikro-Collector, using the Hersey reverse-jet principle, including wool felt tubes, was installed. One or more wool felt tubes, surrounded by slotted rings moved up and down by chains or cables and fed with air by a hose from a positive displacement blower or high centrifugal fan, is the basic Hersey method. See illustration. The jet moves progressively over the filter medium by means of a moving slotted tube which contacts and indents the filter medium.

RESULTS: Daily material loss was entirely eliminated, and the installed cost of the dust collector, $5,000, was paid for in 55 days.

Flower Pots Dried in Two-deck Oven Fired by Warm-air Space Heaters

PROBLEM: Drying too quickly will crack newly pressed flower pots, and drying too slowly slows production. Wanted, an adequate source of heat to remove, within a reasonable time, sufficient moisture to give them adequate strength for stacking in the firing kiln.

SOLUTION: Two-deck oven dryer 35 by 146 ft and 13 ft high, with necessary air duct and diffusers, is fired by two 1 million Btu Dravo Counterflo oil-fired warm-air space heaters, maintaining 140 deg F inside temperature and 70% relative humidity.

Air is drawn into the base of each heater through louvered openings. It passes over staggered banks of economizer tubes, which carry flue gas to the vent stack, and then sweeps over and around the combustion chamber and thence through a duct into a lower deck of the dryer.

Since heaters' stainless steel combustion chambers require no refractory linings, heat transfer from flame to air is virtually instantaneous, causing quick buildup of desired temperature. A thermostat regulates internal temperature through direct control of the burner flame. Initial air movement is supplied by an 11,000-cfm self-contained fan in each heater. A separate booster blower takes air from the lower deck to supply the upper one. Fans strategically located within each deck assure adequate distribution at all times. Two mono-rail conveyors transport the pots through the oven.

RESULTS: Drying time has been so decreased that the company now has capacity to handle full output of the pot presses, a condition never before attainable with the previous drying method.

Ducts Built into Arches of Domed Sanctuary

Early in the planning stages a decision was made not to use exposed ducts for air distribution in the 2000-seat, domed sanctuary of the Oklahoma City First Christian Church of Tomorrow. It was felt they would not be in keeping with the proposed architectural scheme of the room.

This was solved by building the ducts into eight arches surrounding the dome, completely hiding the duct system

except for occasional grille outlets at the top. Beehive-shaped building is constructed of thin-shelled pre-cast concrete. Wooden forms, on which were laid steel mesh, were removed after concrete was fully cured. A 107-mph gale has proven the dome's strength.

Sanctuary is crowned by a stainless steel cap to protect it from moisture seepage. Clear glass bubbles are set in the cap to admit light. A 150-ton capacity Trane Centravac centrifugal refrigeration unit is the principle piece of equipment used in the air conditioning system of sanctuary, four-story circular educational building (center) and fine arts building.

Directly behind sanctuary is the 4-story circular educational building housing 50 class and assembly rooms and one dining room. Shading is provided by vertical louvers running completely around the building circumference.

Tourist Facilities at Grand Canyon South Rim Grow with Decentralized Steam Supply

Eight thousand daily visitors at the peak of the season can throw a considerable strain on resort facilities. At Grand Canyon National Park, the Fred Harvey Company is currently engaged in a million dollar improvement program to help provide for the ever increasing influx of tourists who are attracted by the scenic grandeur of the South Rim. Purchased by the company from the Santa Fe Railway in 1955, the facilities include hotels, sightseeing services, service buildings, and equipment.

An important part of the current program at the South Rim is a complete revision of the old centralized steam system. The old central boiler plant was abandoned, and new boilers installed, three of which are York-Shipley oil-fired packaged steam generators. Two 100-hp high-pressure units will furnish the steam power required for laundry and dry cleaning facilities. A 20-hp steam generator provides 125 psi steam required for hotel kitchen cooking. This unit was placed between two low-pressure boilers of another make. The boilers are automatically operated by electrical controls, responding to changes in steam pressure.

The decentralization of the steam generating units, in addition to modernizing an outmoded system and providing expanded steam generation services, is expected to result in considerable economy of annual operating and maintenance expenditures.

DEGREE-DAYS FOR DECEMBER, 1956

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING's 29th Year of Publication of Monthly Degree-Day Data

City	December			Season to December 31, incl.*		
	1956	1955	Normal	1956	1955	Normal
Abilene, Texas (A)	489	576	595	911	1026	1098
Albany, New York (A)	1066	1377	1197	2541	2759	2559
Albuquerque, New Mexico (A)	880	764	899	1790	1492	1757
Alpena, Michigan (C)	1153	1302	1218	2786	2892	2827
Anaconda, Montana (C)	(a)	1323	1238**	(a)	3463	3171**
Asheville, North Carolina (C)	481	845	769	1346	1733	1633
Atlanta, Georgia (A)	324	664	614	814	1235	1125
Atlantic City, New Jersey (C)	605	992	831	1385	1731	1597
Augusta, Georgia (A)	300	611	494	722	1145	835
Baltimore, Maryland (C)	567	958	812	1224	1749	1537
Billings, Montana (A)	1050	1305	1172	2435	3136	2739
Binghamton, New York (C)	932	1289	1113	2224	2557	2417
Birmingham, Alabama (A)	322	607	596	822	1242	1128
Bismarck, North Dakota (A)	1369	1820	1535	3173	4067	3458
Block Island, Rhode Island (A)	772	1115	927	1774	2079	1936
Boise, Idaho (A)	1059	912	1054	2490	2342	2340
Boston, Massachusetts (A)	893	1181	998	1957	2258	2008
Bozeman, Montana (C)	(a)	1321	1293**	(a)	3438	3286**
Buffalo, New York (A)	947	1229	1116	2143	2491	2424
Burlington, Iowa (A)	1070	1221	1150	2039	2535	2334
Burlington, Vermont (A)	1196	1496	1308	2781	3038	2859
Butte, Montana (C)	(a)	1401	1261**	(a)	3641	3183**
Cairo, Illinois (C)	608	857	784	1170	1607	1465
Charleston, South Carolina (C)	194	508	410	460	775	658
Charlotte, North Carolina (A)	365	748	682	947	1346	1274
Chattanooga, Tennessee (A)	416	745	710	1041	1511	1380
Cheyenne, Wyoming (A)	994	1041	1125	2564	2767	2840
Chicago, Illinois (C)	927	1141	1074**	1822	2250	2172**
Cincinnati, Ohio (C)	604	919	880	1303	1779	1711
Cleveland, Ohio (A)	828	1127	1057	1850	2284	2171
Columbia, Missouri (A)	693	1030	989	1440	2042	1967
Columbia, South Carolina (A)	283	648	682	723	1159	1144
Columbus, Ohio (C)	732	1058	983	1613	2126	1995
Concord, New Hampshire (A)	1170	1446	1271	2824	3015	2839
Concordia, Kansas (C)	879	1157	1029	1748	2271	2048
Dallas, Texas (A)	433	550	518	802	951	870
Dayton, Ohio (A)	790	1102	1032	1764	2239	2122
Deer Lodge, Montana (C)	(a)	1344	1331**	(a)	3597	3518**
Denver, Colorado (A)	901	911	1032	2075	2230	2348
Des Moines, Iowa (A)	1111	1343	1203	2183	2768	2455
Detroit, Michigan (A)	929	1165	1101	2057	2360	2325
Devils Lake, North Dakota (C)	1574	1955	1668	3609	3491	3795
Dodge City, Kansas (A)	869	999	980	1701	2017	1951
Dubuque, Iowa (A)	1207	1423	1290	2508	2967	2765
Duluth, Minnesota (C)	1518	1716	1550	3523	3880	3533
Elkins, West Virginia (A)	700	1140	995	1942	2450	2255
El Paso, Texas (A)	624	477	626	1183	828	1086
Ely, Nevada (A)	1117	1121	1181	2938	2920	2864
Escanaba, Michigan (C)	1275	1388	1321	2935	3064	3056
Evansville, Indiana (A)	688	971	871	1487	1919	1715
Fargo, North Dakota (A)	1494	1845	1615	3215	3986	3538
Fort Smith, Arkansas (A)	599	769	698	1140	1416	1273
Fort Wayne, Indiana (A)	935	1185	1122	2037	2444	2365
Fort Worth, Texas (A)	468	553	533	863	964	890
Fresno, California (A)	627	455	580	1109	935	1011
Galveston, Texas (C)	154	246	271	301	398	402
Grand Junction, Colorado (A)	1235	900	1132	2438	2100	2293
Grand Rapids, Michigan (A)	1018	1218	1169	2259	2590	2597
Green Bay, Wisconsin (A)	1310	1488	1392	2912	3177	3035
Greensboro, North Carolina (A)	493	890	772	1291	1670	1513
Greenville, South Carolina (A)	372	740	648	986	1345	1200
Harrisburg, Pennsylvania (A)	762	1124	964	1834	2166	1971
Hartford, Connecticut (A)	926	1260	1082	2359	2450	2266
Hatteras, North Carolina (C)	259	645	481	532	981	788
Havre, Montana (C)	1218	1605	1383	2851	3969	3240
Helena, Montana (A)	1145	1427	1311	2836	3644	3247
Houston, Texas (C)	189	260	303	363	462	465
Huron, South Dakota (A)	230	1726	1407	2731	3612	3003
Indianapolis, Indiana (A)	808	1119	1051	1766	2290	2141
Jackson, Mississippi (A)	298	517	503	705	1037	882
Kansas City, Missouri (A)	866	1020	970	1568	1960	1875
Knoxville, Tennessee (A)	415	806	744	1045	1594	1454
La Crosse, Wisconsin (A)	1247	1531	1380	2586	3116	2900
Lander, Wyoming (A)	1204	1300	1383	2889	3134	3309

(a) Data not available.

*Heating season cumulative, from Sept. 1.

**Same normal figures as previously listed by HEATING AND VENTILATING since new figures are not available. All other normal figures in this table are based on a 30-year period covering 1921 to 1950, inclusive, recently compiled and published by the U. S. Weather Bureau.

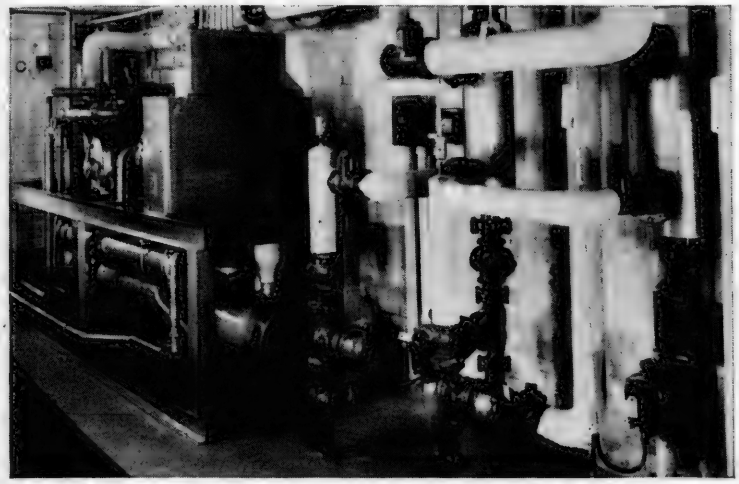
Figures in this table, with eight exceptions, based on local weather bureau reports. Exceptions are Utica and Lewiston, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y., and Norman E. Ross, Bursar, Bates College, Lewiston, Me., respectively; Anaconda, Bozeman, Butte, Deer Lodge and Livingston, Mont., through the courtesy of the Montana Power Company. Tacoma figures through the courtesy of the Tacoma News Tribune.

[Table concluded on page 146]

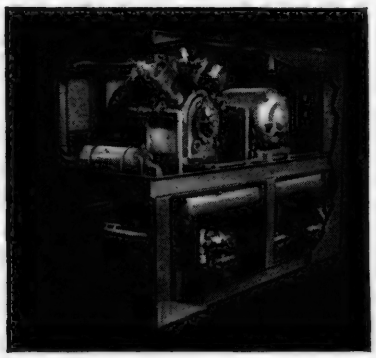
IN 1957...

get better performance...faster service with

B&G Cooling Equipment



B&G Package Liquid Cooler, Booster Pumps, Flo-Control Valves and other auxiliary equipment used in combination heating and cooling system



PACKAGE LIQUID COOLER

A complete cooling unit for homes, apartments, commercial and industrial buildings, process work. Design highlights include low pressure drop through evaporator—non-recycling pump-down—integrated electrical control system—low center of gravity for easy installation. Completely wired, including chiller and tower pump. Send for Bulletin HB-755.

Specifying "B&G" throughout assures you of equipment known for quality—with a single manufacturer's responsibility for satisfactory operation.

B&G 1522 and 1531 Pumps, for example, have a long record for dependable, economical and *quiet* performance. Among their many features are the "Remite" leakproof mechanical Seal and vertical split case design.

B&G Evaporators, Condensers and other heat exchange equipment offer time-tested design—rugged construction—precision workmanship—all combined to provide top performance and long life. These units are built to ASME Code requirements.

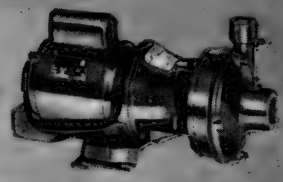
Write today for a complete file of B&G air conditioning and refrigeration equipment literature.

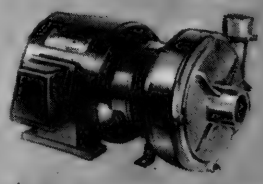
BELL & GOSSETT
COMPANY
Dept. RER-4, Morton Grove, Illinois
Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Drive, West Toronto

★ STOCK SERIES
FOR IMMEDIATE SHIPMENT

To give you fast service, most frequently used sizes of the units starred below are kept in factory stock for immediate delivery. Write for descriptive literature.

★ **B&G Series 1522 Pumps**

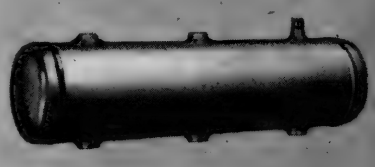




★ **B&G Series 1531 Pumps**

★ **B&G Model CRF Straight Tube Condensers**

★ **B&G Model CFG Shell and Coil Condensers**



★ **B&G Model LRS Liquid Receivers**

★ **B&G Series RG Heat Exchangers**

B&G Evaporators

Degree-Days for December, 1956 (Concluded)

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING'S 29th Year of Publication of Monthly Degree-Day Data

City	December			Season to December 31, incl.*		
	1956	1955	Normal	1956	1955	Normal
Lewiston, Maine (O)	1180	1398	1295	2812	2862	2837
Lincoln, Nebraska (C)	938	1234	1113	1855	2480	2243
Little Rock, Arkansas (A)	492	693	654	958	1278	1179
Livingston, Montana (C)	(a)	1196	1117**	(a)	3065	2731**
Los Angeles, California (C)	135	279	253	211	487	451
Louisville, Kentucky (A)	(a)	919	871	(a)	1806	1733
Lynchburg, Virginia (A)	527	950	809	1410	1809	1625
Macon, Georgia (A)	274	540	481	650	1000	824
Madison, Wisconsin (A)	1216	1392	1287	2504	2879	2707
Marquette, Michigan (C)	1255	1381	1299	2900	3143	3011
Memphis, Tennessee (A)	482	695	673	969	1340	1248
Meridian, Mississippi (A)	290	528	528	724	1076	956
Milwaukee, Wisconsin (A)	1139	1308	1218	2454	2724	2611
Minneapolis, Minnesota (A)	1267	1631	1414	2660	3363	2990
Moline, Illinois (A)	1108	1259	1181	2196	2600	2426
Montgomery, Alabama (A)	273	513	491	672	999	864
Nashville, Tennessee (A)	450	785	725	1045	1573	1372
New Haven, Connecticut (A)	872	1177	1026	2039	2255	2145
New Orleans, Louisiana (C)	123	301	283	309	504	429
New York, New York (C)	732	1069	908	1595	1908	1771
Newark, New Jersey (A)	767	1101	961	1693	1989	1912
Norfolk, Virginia (A)	390	837	688	902	1370	1257
North Platte, Nebraska (A)	1040	1354	1172	2355	3006	2563
Oak Ridge, Tennessee (C)	427	828	812	1009	1705	1587
Oakland, California (A)	547	428	508	1120	1066	1077
Oklahoma City, Oklahoma (A)	713	849	747	1316	1600	1367
Omaha, Nebraska (A)	1004	1284	1166	1995	2618	2368
Parkersburg, West Virginia (C)	643	990	896	1508	1941	1824
Peoria, Illinois (A)	1026	1194	1128	1976	2439	2312
Philadelphia, Pennsylvania (C)	664	1010	856	1405	1733	1624
Phoenix, Arizona (A)	356	277	360	617	459	555
Pittsburgh, Pennsylvania (C)	683	1013	924	1588	2011	1890
Pittsfield, Massachusetts (A)	1083	1431	1246	2725	3033	2845
Pocatello, Idaho (A)	1163	1026	1184	2870	2678	2727
Portland, Maine (A)	1156	1448	1237	2788	3056	2776
Portland, Oregon (C)	711	729	701	1690	1773	1600
Providence, Rhode Island (A)	885	1219	1035	2103	2372	2195
Pueblo, Colorado (A)	916	887	1051	2022	2030	2279
Raleigh, North Carolina (A)	428	850	651	1104	1546	1166
Rapid City, South Dakota (A)	1083	1331	1218	2521	3133	2802
Reading, Pennsylvania (C)	741	1092	936	1715	2018	1866
Red Bluff, California (A)	544	519	564	954	964	942
Reno, Nevada (A)	1063	905	986	2545	2303	2338
Richmond, Virginia (A)	493	928	791	1233	1678	1532
Rochester, New York (A)	993	1251	1141	2289	2588	2473
Roswell, New Mexico (A)	715	692	750	1425	1326	1415
Sacramento, California (C)	581	451	567	998	868	980
St. Joseph, Missouri (A)	965	1142	927	1819	2309	1809
St. Louis, Missouri (C)	769	945	893	1424	1813	1703
Salt Lake City, Utah (A)	1077	858	1039	2449	2225	2279
San Antonio, Texas (A)	271	359	374	504	609	600
San Diego, California (A)	156	236	255	268	445	478
Sandusky, Ohio (C)	844	1123	1039	1842	2227	2116
San Francisco, California (C)	372	362	406	804	992	881
Sault Ste. Marie, Michigan (A)	1390	1478	1398	3256	3378	3340
Savannah, Georgia (A)	232	507	412	562	877	675
Scranton, Pennsylvania (A)	943	1277	1057	2314	2563	2254
Seattle, Washington (C)	669	730	679	1762	1975	1682
Sheridan, Wyoming (A)	1073	1345	1271	2630	3259	3045
Shreveport, Louisiana (A)	344	493	490	701	923	848
Sioux City, Iowa (A)	1151	1444	1290	2300	2959	2708
Spokane, Washington (A)	1055	1179	1113	2739	3067	2705
Springfield, Illinois (A)	937	1121	1017	1824	2272	1998
Springfield, Missouri (A)	784	958	908	1519	1906	1833
Syracuse, New York (A)	979	1333	1113	2287	2605	2340
Tacoma, Washington (C)	(a)	736	719	(a)	2000	1850
Toledo, Ohio (A)	923	1289	1119	2114	2571	2364
Topeka, Kansas (C)	879	1068	977	1623	2074	1891
Trenton, New Jersey (C)	728	1095	930	1656	1987	1852
Tulsa, Oklahoma (A)	689	816	750	1239	1505	1382
Utica, New York (O)	1413	1373	1144**	2851	2720	2537**
Valentine, Nebraska (A)	1051	1458	1212	2498	3206	2709
Walla Walla, Washington (C)	820	949	890	2049	2284	1966
Washington, D. C. (C)	594	951	831	1351	1706	1604
Wichita, Kansas (A)	856	980	915	1577	1913	1763
Williston, North Dakota (C)	1401	1778	1528	3183	4072	3495
Winnemucca, Nevada (A)	1138	995	1085	2769	2636	2595
Yakima, Washington (A)	1044	1244	1066	2576	2936	2469

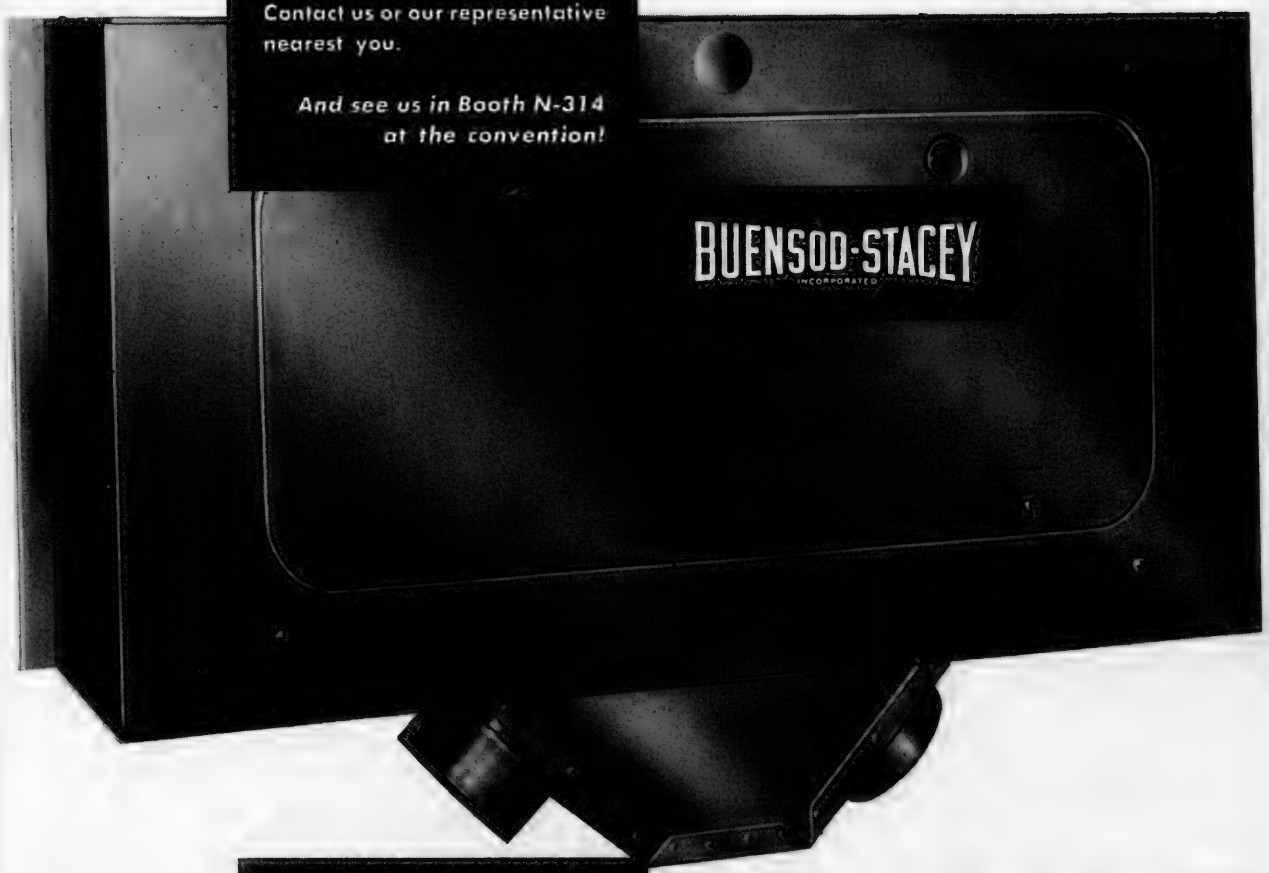
For footnotes, see page 144.

DUAL-DUCT

ALUMINUM

—inside and out. It's a Buensod first. Only Buensod makes *aluminum* air mixing units. Light. Corrosion-resistant. The obvious choice for your next project. Contact us or our representative nearest you.

And see us in Booth N-314 at the convention!



BUENSOD-STACEY, Inc.

Buensod representatives are —

Atlanta, Crawley-Gorbandt Co.
Birmingham, Bratton Sales Engineers
Boston, Leonard F. Luchner
Charlotte, Robert E. Mason & Co.
Chicago, Air Products Equipment Co.
Cincinnati, J. W. Snyder
Dallas, I. M. Golan Co.
Davenport, Iowa, D. C. Murphy Co.
Dayton, Frey Equipment Co.
Des Moines, D. C. Murphy Co.
Fort Wayne, Paller Engineering Co.
Fort Worth, I. M. Golan Co.
Houston, W. L. Lashley & Associates
Indianapolis, Paller Engineering Co.
Los Angeles, Cooling & Heating Engineers
Milwaukee, Air Equipment Distributors of Wisconsin
Minneapolis, E. J. Baker Co.
Mobile, Alabama, Bratton Sales Engineers
Philadelphia, James R. McQuaide
Portland, Ore., Mead & Associates
St. Louis, D. S. Anderson Co.
San Francisco, H. W. Baker Co.
Seattle, George E. Mead Co.
Shreveport, R. F. Zimmerman & Co.
Toledo, Air Handling Products Co.

NEWS OF EQUIPMENT AND MATERIALS

Use the convenient prepaid postcard appearing on page 125 for securing additional information on new equipment and materials described in this department.

Wrap-Around Water Tank Heaters

Two new wrap-around water tank heaters for storage-type electric water heaters are available from the Westinghouse Electric Corp., Pittsburgh, Pa. In models from 600 to 3000 watts, the heaters consist of aluminum-finished steel sheathing over built-up mica insulation that completely protects the hi-duty nichrome wire heating element.

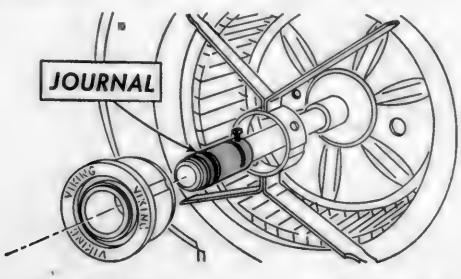
The flexible band is easily clamped to the tank wall to provide contact, delivering a low even heat to the wall to guard against hot spots and burn-outs. Once around the tank, the heater is drawn snug by a tension clamp with a leaf or coil spring. Gripper-type electric terminals provide quick and firm connections. The heater bands are available with both terminals at one end or one terminal at each end.

The rust-proof heaters are for nominal tank sizes 14 to 20 in. in diameter, but extension band assemblies are available when the heater length is less than the tank circumference.

More information? Circle Item 1 on postcard, page 125.

Bearings Have Built-in Journals

Cushioned Mark III blower bearings with built-in journals, made by Viking Air Products, a division of National-U.S. Radiator Corp., Cleveland, Ohio, are designed to eliminate costly, precision-ground blower shafts and to operate more effectively in higher-speed, year-round residential comfort systems.



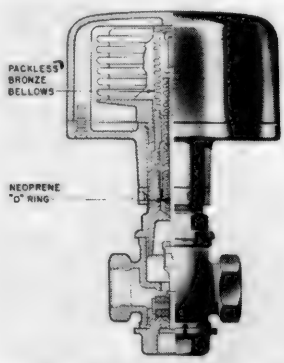
Journals are hollow, precision-ground shafts themselves which accept inexpensive, cold-rolled blower shafts with up to .006-in. clearance. They increase bearing surface as much as ⅓ over bearings without journals, reducing loads per sq in., and adding to bearing life, the company states.

Metal parts of the bearing nest in large, flexible neoprene cushions which let the bearings align themselves with blower shafts. The cushion is also an extra-large lubricant reservoir holding twice the lubricant of former bearings. This extra capacity is designed for year-round lubrication requirements, especially during peak summer operation. If the user wants to add oil, he can pierce self-closing holes in the neoprene cushion with an oil can spout.

More information? Circle Item 2 on postcard, page 125

Packless Control Valves

Packless control valves, designed for reduced valve maintenance and operating costs, and more precise control, are available from Powers Regulator Co., Skokie, Ill. These pneumatic valves are made for convectors, unit ventilators, air conditioners, and radiators.



Instead of packing, the valves use a bronze bellows as a primary seal and a spring-loaded neoprene O-ring as a secondary seal. The bronze bellows eliminates leakage found in conventional packed valves and requires no maintenance. Should the packless bellows become damaged, the neoprene ring at its base will effectively prevent steam or water leakage and vacuum loss. This permits normal valve operation until the damaged bellows is replaced. The top of the packless valve is easily removable so that the bronze bellows can be replaced without draining the water system, shutting off steam, or removing the valve from the line.

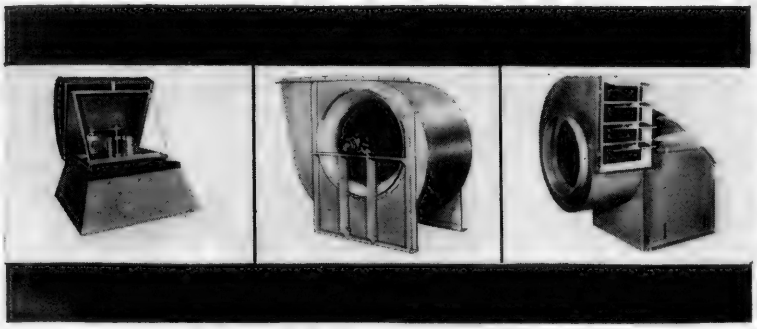
Better control is gained by the double seal construction, the company said. The resistance of each seal is a constant factor. The stem cannot become bound through improper maintenance, as with conventional packed valves.

More information? Circle Item 3 on postcard, page 125.

(*Continued on page* 150)

See us at the Exposition!

Thirteenth Annual International Heating and Air Conditioning Exposition
International Amphitheatre
Chicago, Illinois
February 25th to March 1st
1957



Be sure to visit our display
See the NEW non-overloading backward curved packaged utility set (MSV-PF Blower)
Also see our non-overloading backward curve power roof ventilator with full venturi curved inlet cone

In the development of these units, performance, quality and ruggedness of construction have been foremost in mind.

To appreciate this you must SEE our display. Stop in and let us show you.

It's BOOTH 132

For your ventilation or air moving problem, call our district sales office in your locality, or apply to the factory sales department. You can be sure of prompt and courteous service.

MASSACHUSETTS BLOWER DIVISION
The BISHOP & BABCOCK Mfg. Co.
4901 HAMILTON AVENUE CLEVELAND 14, OHIO

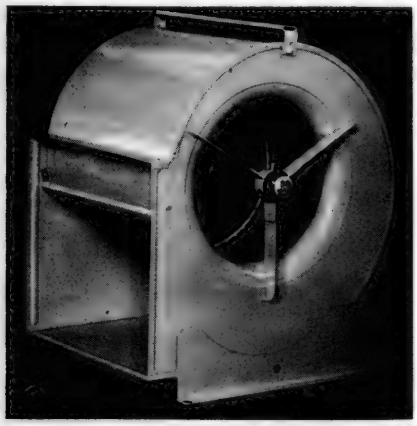
The MASSACHUSETTS Line

(*Continued from page* 148)

Residential Blowers

Assembled blowers and large blower wheels for residential air conditioning and warm air heating are being produced by The Torrington Mfg. Co., Torrington, Conn.

Available in 6 sizes for both belt and direct drive, blower units include the recently developed center-lock wheel. Wheel sizes now available, selected for interchangeability in present air-moving equipment, are 9½ in.

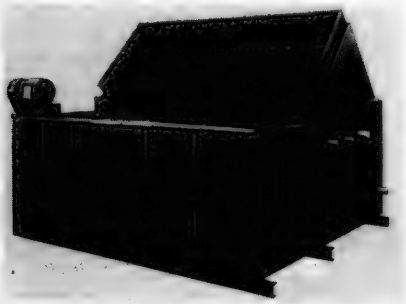


dia. (7½ and 9½ in. wide), 10⅝ in. dia. (8 and 10⅝ in. wide), and 12⅝ in. dia. (9½ and 12⅝ in. wide). Construction features of the blower series are: heavy-gage steel and spot-welded housings, 2 motor mounting locations for each angle of discharge, and extra-long sintered bronze bearings with bearing ball assembly encased in rubber. A multi-position unit also available will allow the user to assemble the housing feet in any of four positions.

More information? Circle Item 4 on postcard, page 125.

Multi-Zone Air Conditioners

For buildings where both heating and cooling are required simultaneously, the MC central station type air conditioning unit is offered by McQuay, Inc., Minneapolis, Minn.



Each of the eight sizes, ranging from 1370 to 21,000 cfm, and from 6 to 22 zones, delivers either heated and humidified or cooled and dehumidified air. In each zone one hot air and one cold air damper are so arranged on a common shaft that when one is closed the other is open.

Double tube steam coils are furnished as standard equipment to provide minimum variations in leaving air temperatures across the coil face. For maximum efficiency and to help equalize static pressures, face velocity through the heating coils is approximately 900 fpm when the cooling face velocity is 500 fpm. All steam coils are pitched toward the return connection for proper drainage of condensate.

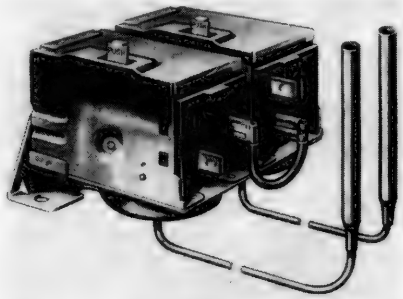
All units are offered in either horizontal or vertical models. Two types of discharge sections are available, horizontal and angular. The angular section is designed for vertical air discharge or a combination of vertical and horizontal air discharge.

More information? Circle Item 5 on postcard, page 125.

Air Conditioning Controls

A new group of pressure operated air conditioning controls is produced by Ranco, Inc., Columbus, Ohio.

The new G series includes both high and low-pressure models with automatic or manual reset; low-pressure cycling controls with differential adjustment; and dual-pressure controls. The control offers a choice of switch



assemblies to accommodate varied applications from pilot duty of 345 volt-amperes at 230 volts to heavy duty requirements of 15.5 amp, full load, and 84 amp, locked rotor at 115 volts a-c.

Ranges of the new units vary from 7 to 425 psi (non-adjustable). Single-pressure models offer adjustable differentials. All controls in the series are operated by pressure expansion type bellows, opening the contacts on a rise or decrease of pressure.

More information? Circle Item 6 on postcard, page 125.

Centrifugal Roof Ventilator

A new centrifugal roof ventilator is marketed by The Peerless Electric Company, Warren, Ohio.

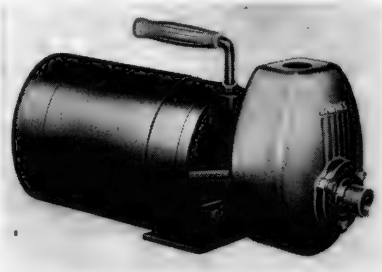
Straight line, modern contours mark the centrifugal roof ventilator for use in modern and contemporary architecture. All moving parts are resiliently mounted on a heavy duty angle iron frame. The dynamically balanced, non-overloading, backward curve wheel is taper-locked to the shaft. The wheel cone accurately fits the true span venturi inlet to assure quiet air movement and high efficiency.

The manufacturer's centrifugal roof ventilators have PFMA certified ratings. They are built completely of 16-gauge steel or better for durability and stamina.

More information? Circle Item 7 on postcard, page 125.

Portable, Close-Coupled Pump

A new electrically driven close-coupled pump, introduced by Barnes Manufacturing Co., Mansfield, Ohio, is the latest addition to their self-priming centrifugal pump line. Model 1MAE was developed to augment the firm's established series of lightweight pumps designed for portable use or permanent pit installation.

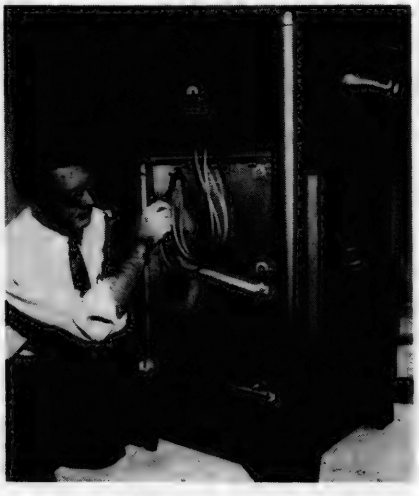


The new pump is direct-connected to a ⅓ hp motor of the 115 volt, 60 cycle, split-phase type delivering 3450 rpm. Pump discharges 1440 gph at a 24-ft head. A balanced angle grip on top serves to make the pump easy to carry, ideal for many emergency purposes and convenient standby use.

More information? Circle Item 8 on postcard, page 125.

Electronic Air Filter

An electronic air filter which utilizes high voltage current to give positive charges to dust particles, so they can be collected on negative charged plates, is being manufactured by Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. The unit which measures 4 ft by 4 ft by 3 ft is designed for commercial applications—a model for homes will be produced at a later date.



The unit is plugged into a standard 110 a-c outlet and a transformer used for boosting the voltage. Dust particles pass through a 13,000-volt electrostatic field where they receive a positive electrical charge. The positively charged ions are attracted to negatively-charged collector plates which carry 6,500 volts. They are repelled by alternately placed positive plates in the collector unit. The collected dust particles are periodically washed off the plates by a water spray.

One model has a capacity of 1300 cfm although other models will have capacities up to 150,000 cfm.

The 1300 cfm model requires 65 watts of power and every 7 or 8 months uses 5 gal of water at 30 psi per cell for washing. Rated power requirements are 50 watts plus 10 watts for each 1000 cfm.

The unit can be installed in the ductwork of heating, ventilating and air conditioning systems to assure that all air delivered to rooms will be cleaned.

More information? Circle Item 9 on postcard, page 125.

Air Conditioners Precharged

Featuring a precharged liquid and suction line tubing assembly, with break-away valves, 1¾, 2, 3, and 5-ton remote air-cooled compressor-condenser air conditioners are announced by Vendorlator Mfg. Co., Fresno, Calif.

Units are equipped with a factory-wired single or 3-phase control panel for automatic temperature control in summer and winter. Units are currently being produced for original equipment manufacturers and are used in conjunction with forced air furnaces for heating and cooling combinations.

More information? Circle Item 10 on postcard, page 125.

Enters Oil-Fired Boiler Field

With the introduction of Models 271 and 272 oil-fired boilers, Bryant Mfg. Co., a division of Carrier Corp., Indianapolis, Ind., enters a new field.

Model 271 is for forced hot water systems and is available in sizes of 89,000, 105,000 and 131,000 Btu per hr output. The largest size stands just over 4 ft high and occupies less than 6 sq ft of floor space. Completely factory-assembled and wired, boiler is shipped as a unit, ready for installation and requiring only service connections.

Model 272 is for both hot water and steam systems and its range of 11 sizes runs from 100,000 to 1,000,000 Btu gross output. It is shipped with a completely insulated and jacketed boiler, oil burner, draft regulator, combustion chamber, primary control, thermostat, and limit control. Trim for steam units includes water gage, ASME relief valve, and internal syphon steam pressure gage. Removal of access plate on the boiler top permits tubes to be easily cleaned.

On both models a water heating coil that does away with the hot water storage tank entirely is optional equipment. Company executive at left in illustration is shown with his hand on zig-zag baffle.

More information? Circle Item 11 on postcard, page 125.

(*Continued on page* 154)

"seein's believin'!"

KOCH
JET ACTION
COOLING TOWER

nothing cools like water!
Here is the tower that permits you to take full advantange of the efficiency and dependability of water-cooled condensers.

. . . . . .

lower cost!
no moving parts!
attractive—compact!

Sizes to match all self-contained air conditioners 3 to 20 tons

AMAZINGLY SIMPLE DESIGN!
SIMPLY AMAZING PERFORMANCE!

Inlet Diffuser · Inductor Nozzles
Powerful Jet Action Draws Air
500 F.P.M. Velocity Assures Intimate
Contact with Air Water Self Cleaning
Dynamic Sprays No Wood Fill
360° Glass Eliminator Plastic to Finish Top to Bottom

Koch Engineering Company, an oil industry equipment manufacturer for more than 30 years, is world famous for its developments in heat transfer refinery processes. The same engineering skill that makes Koch outstanding in the oil industry has gone into the manufacture of the revolutionary Koch Jet Action Cooling Tower.

KOCH
ENGINEERING CO.
321 West Douglas
Wichita, Kansas

A few areas are open for Manufacturer's Representatives. Right now... write for information or see us at the Exposition.

"MAGNETIC COUPLING"
Exclusive Feature of
DWYER
MAGNEHELIC PRESSURE GAGE

The unique design cannot be harmed by sudden pressure surges, shock loading or severe vibration. For accuracy, sensitivity, and long service life the Dwyer Magnehelic Gage cannot be equalled.

Extreme accuracy results from the elimination of friction between the flexible diaphragm and the indicating mechanism. A magnetic force transmits pressure fluctuations to the 3½" easy-to-read dial of the Dwyer Magnehelic Gage.

Send for Bulletin No. 250 for complete description today.

A Precision Instrument Sensitive to Pressure, Pressure Differentials or Vacuum from 0-1" water or 0-2 psi.

F. W. DWYER MFG. CO.
P.O. BOX 373-N MICHIGAN CITY, INDIANA

HARRIS

for any liquid for high pressures
for high temperatures

Write today for Harris Float Catalog with complete technical data.

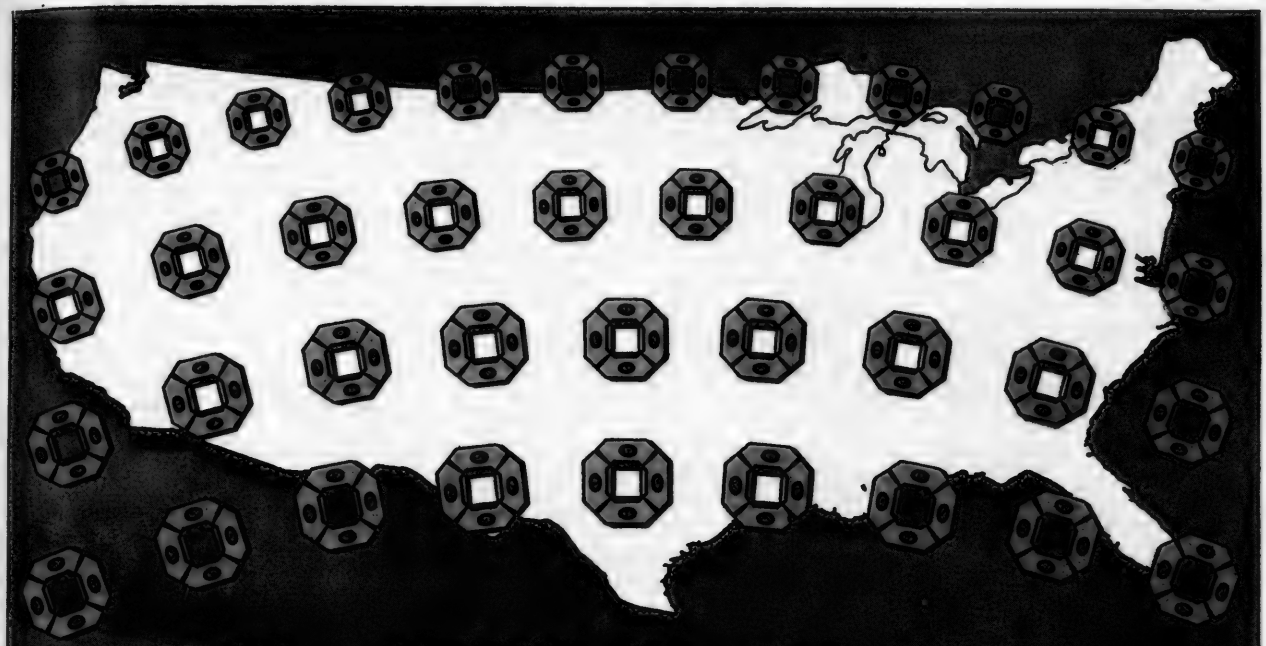
If you have a liquid level control problem that involves a float, send for Harris Float Catalog with its complete technical data on the various types, sizes of floats, and the metals suitable for different corrosive liquids, temperatures, and pressures.

Harris Floats are made in sizes from 2½" to 14" diameter in ball, cylinder, conical, rectangular or disk shapes of Copper, Stainless Steel, Aluminum, Nickel, Monel, or Steel or other suitable, workable metals.

Harris engineers, with a background of 72 years of experience, will be glad to help you select or design the right float for your installation.

ARTHUR HARRIS & CO.
206 No. Aberdeen Street, Chicago 7, Illinois

FLOATS



The BEST Distributors in America SELL

READING COPPER TUBE

We, at Reading, consider it highly significant that America's leading distributors have chosen Reading Copper Tube to sell and recommend. These distributors build their business by handling the finest products—products whose quality and performance they can depend on to uphold their reputation for giving customer satisfaction. Of equal importance to them is service. And they know from experience that Reading's streamlined, shirt sleeve service eliminates delays . . . speeds delivery from factory . . . to distributor . . . to contractor. Next time you need copper tube . . . specify Reading . . . precision product of one of America's largest, completely integrated mills, specializing in the processing of copper tube from basic metal to finished tubing . . . and sold by America's best distributors.

READING COPPER · BRASS TUBE

READING TUBE CORPORATION

EMPIRE STATE BUILDING, NEW YORK 1, N. Y. WORKS: Reading, Pa.

Distribution Depots:

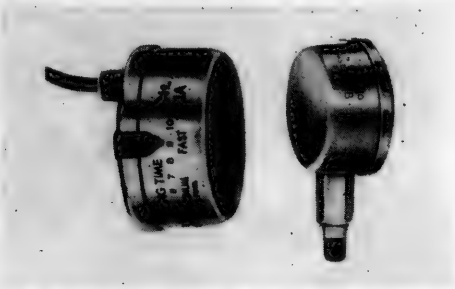
READING, PA.
WOODSIDE, L.I., N.Y. 57-17 Northern Blvd.
CHICAGO, ILL. 724 W. 50th St.
DALLAS, TEXAS 9000 Sovereign Row Brook Hollow Industrial District
HOUSTON, TEXAS 1121 Rothwell St.
OAKLAND, CALIF. 410 Hegenberger Road
LOS ANGELES, CALIF. 120 No. Santa Fe Ave.
DENVER, COLO. 2845 Walnut St.
CLEVELAND, OHIO 4615 Perkins Ave.
ATLANTA, GA. 690 Murphy Ave. S.W., Unit 5, Bldg. B

Sold Through Wholesalers Only

(*Continued from page* 151)

Air Valves Vent Rapidly

Two air valves for one-pipe steam systems are developed by Flair Mfg. Corp., Brooklyn, N. Y. Both No. 1A, chrome plated and singly packed, and No. 1B, polished



brass packed 12 per carton, offer a simple finger venting-speed adjustment from very slow to very fast.

Valves will vent rapidly even at very low pressures, the manufacturer states, and have a seat construction that assures positive seal against steam at all times. All attachments and most joints are silver brazed. They are unconditionally guaranteed for one year.

More information? Circle Item 12 on postcard, page 125.

Smaller Absorption Cooling Units

Two new smaller sizes of automatic absorption refrigerating machines which use heat energy to produce cooling have been announced by Carrier Corporation, Syracuse, N. Y. These machines, previously available in a range of models developing 100 to 700 tons of capacity, will now be produced in 60 and 80 ton sizes as well.

Introduction of the smaller models makes available for the first time the many advantages of the absorption cooling machine to a great number of stores, supermarkets, small office buildings and light manufacturing concerns.

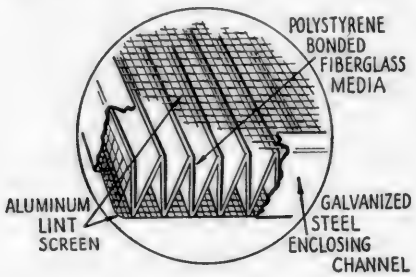
The units have no major moving parts and use plain water as a refrigerant. The vibrationless performance and light weight has spearheaded a trend towards location of the machine rooms on the roofs of buildings freeing interior space for storage, parking or even extra office area. Overloading cannot damage the unit since there are no moving assemblies to be harmed. If cooling beyond design capacity is signalled by the air conditioning system, the machine will continue to operate, delivering additional tons of refrigeration at a higher temperature level.

Steam as well as such hot fluids as water, oil or chemicals, can be used to generate cooling in the unit. Low-pressure or waste steam which might otherwise be exhausted to the atmosphere can be employed as the energy source for absorption equipment thus providing a free source of power for air conditioning.

More information? Circle Item 13 on postcard, page 125.

Dry-Type Washable Air Filter

Especially efficient in removing lint from recirculated air is Model P-70 air filter with a dry, oilless, washable panel, produced by Air Maze Corp., Cleveland, Ohio. It



is particularly suitable, the company states, in applications where oil vapors cannot be tolerated.

Offered in 2-in. thick panels, 16 x 20, 16 x 25, 20 x 20, and 20 x 25, a 20 x 20 x 2-in. panel, for instance, has more than 20 sq ft of filtering surface.

Filter is not sensitive to changes in air velocity within normal range. Screen grids on both sides of filter permits lint to be brushed off several times before washing is necessary. Filter can be washed in cold water, or cleaned with a vacuum nozzle. The filter is made entirely of corrosive-resistant materials, as illustrated.

More information? Circle Item 14 on postcard, page 125.

Precipitator Velocities to 600 Fpm.

Improvements in its line of Precipitron electronic air cleaners, resulting in reduced first cost, space requirements, and installation cost, are announced by Sturtevant Div., Westinghouse Electric Corp., Boston, Mass.

Air cleaning efficiencies have been improved by redesign of the working elements to allow velocities up to 600 fpm, the company says, and new units incorporating these features provide as much as 35% reduction in cost for high-efficiency air cleaning. Cleaners provide their own enclosures and have fewer parts. Internal high-voltage wiring is eliminated. Hot water facilities for washing are not necessary with use of a cold water adhesive.

Face dimensions of collector cells correspond with standard panel filter sizes, permitting installation where space limitations heretofore prohibited it.

More information? Circle Item 15 on postcard, page 125.

(*Continued on page* 156)

Beautiful New Norman Three-Sixty®

gas-fired, forced convection overhead gas heater, with

- EXCLUSIVE ELECTRIC IGNITION
- SEALED COMBUSTION SYSTEM

The all-new Norman Three-Sixty is the greatest improvement in overhead heating in 25 years. It has more exclusive features than any product in its field. And it has more to offer in beauty, economy, safety and comfort.

This new pressurized Norman unit features a sealed combustion system completely independent of room air. Exclusive electric ignition with no open flame exposed to the room makes the Three-Sixty safe for applications where an ordinary unit heater might create a hazard.

Smartly styled, this new Norman Three-Sixty with its attractive circular spun aluminum casing makes ordinary unit heaters obsolete . . . adds a touch of luxury to the most modern stores and shoppes.

In performance, the Norman Three-Sixty is even more outstanding. It assures an umbrella of comfortable warmth gently distributed outward and slightly downward in a full 360° radius. No hot blasts or cold spots.

Norman Patented Sealed Combustion System

All combustion air is drawn from outside through a separate inlet pipe . . . all exhaust gases are vented to outside through a parallel separate pipe. Fully automatic electric ignition eliminates pilot flame outage. No chimney needed . . . no problem of make-up air . . . no possibility of food contamination from products of combustion . . . no humidity or dust problem.

Phone, wire or mail coupon today for complete details.

NORMAN PRODUCTS CO.
1166 Chesapeake Ave., Columbus 12, Ohio
Please rush complete details and literature on the all-new Norman Three-Sixty.

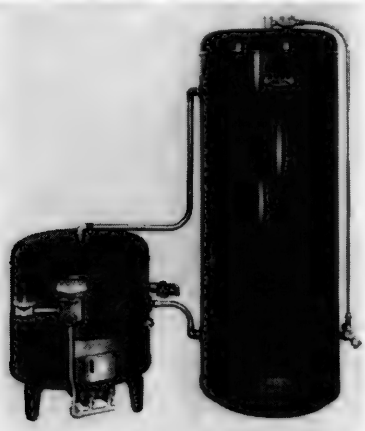
NAME_____ TITLE_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE___ STATE_____

Norman® products company

(*Continued from page* 154)

Hot Water Storage System

The A-138 aluminum alloy storage system is marketed by Ruud Manufacturing Co., Kalamazoo, Mich., to help solve various storage problems in installing or maintaining hot water supply in commercial applications.



This development consists of a 115 gal Alcoa aluminum alloy tank, mounted on a base that is 2½-in. high, and enclosed with heavy insulation within a steel jacket that has a baked enamel finish. The tank has tappings located for handy connections in vertical installations, and can be factory or field equipped with the company's two-temperature kit so both 140 and 180-deg F water can be simultaneously withdrawn.

As illustrated, the A-138 can be secured as a package with the company's AS 20-80 Sanimaster gas water heater. The manufacturer then supplies all circulating pipe connections and fittings. It thus can augment the small water capacity of the new high input commercial water heater.

More information? Circle Item 16 on postcard, page 125.

Explosion-Proof Pressure Control

In an effort to meet the ever-growing demand of industry for more accurate and reliable methods of controlling pressures, United Electric Controls Co., Watertown, Mass., has developed the Type J95 and added it to the company's line of standard controls. This control has been designed for use in locations where explosive vapors or gases are present. Specifically, the enclosure for the J95 provides for using the control in Class I, Groups C and D locations as defined by the National Electrical Code.

The control is an uncalibrated unit, and pressure settings are made by means of an internal adjusting nut. Models are available with a variety of adjustable ranges between the limits of 0 and 500 psi, and maximum pressures of up to 600 psi. On-off differentials between the limits of 2 and 30 psi are obtainable.

The enclosure is made of cast iron and has a gray, baked-enamel finish. It is surface-mounted by four corner holes with clearance for ¼ in. screws.

It can be supplied with any one of three standard types of switches: normally open, normally closed, or double throw with no neutral position. Switches are rated for 15 or 20 amp at 115 or 230 volt a-c. D-c switches are also available. The switch is wired via a ½ in. NPT opening in the enclosure.

More information? Circle Item 17 on postcard, page 125.

Regulator Prevents Overheating

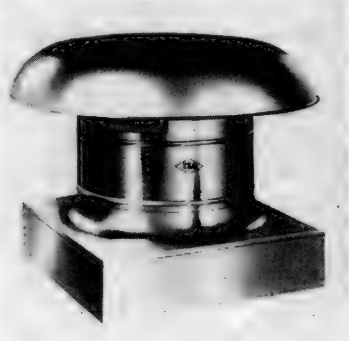
A safety-type temperature regulator is added to its line of self-powered control instruments manufactured by Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.

Designated the No. 997 temperature regulator, it will close automatically to prevent overheating and possible damage to products in process, in the event the thermostatic unit is accidentally damaged. It contains a 4⅝-in. bellows for more powerful response and smoother modulating action in controlling the flow of steam, hot water or other medium. Because it has a special tight-closing, single-seated valve, it is suitable for dead end, or terminal, service. It is available in sizes from ¼ to 2 in., and is recommended for temperature control of industrial processes, storage or instantaneous water heaters.

More information? Circle Item 18 on postcard, page 125.

Roof Ventilators Supply Air

Positive intake of fresh air is assured for buildings with inadequate ventilation or with a negative head of interior air pressure due to high volume exhausting, with Type SRQ power roof ventilators available from Ilg Electric Ventilating Co., Chicago, Ill. These new



roof ventilators reverse conventional ventilating procedure, and blow air in instead of out. They provide high air moving efficiency and economical operation with virtually no maintenance.

The low-silhouette ventilators are available in 5 sizes with low and high speed models, ranging in capacity from 1310 to 11,880 cfm. Shutters, either spring or motor-operated, with interconnected blades to eliminate drafts, are available as accessories. They are mounted in the base of the unit for accessibility.

More information? Circle Item 19 on postcard, page 125.

(*Continued on page* 161)

America lives better—thanks to Copeland...

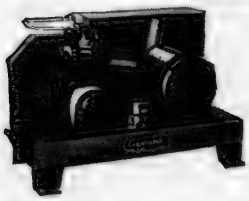
the heart of America's finest air conditioning and commercial refrigeration

Keeping folks cool, comfortable and well fed is a distinguished tradition at Copeland. Copeland's engineering contributions to refrigeration and air conditioning progress have helped bring fresher, more flavorful foods to America's tables, healthfully-cooled buildings in which to live and work. Your products perform better, serve better, sell better . . . powered by Copeland.

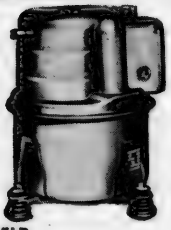
SEE US AT BOOTHS 1220 and 1224
International Heating and Air Conditioning Exposition
International Amphitheater, Chicago
FEBRUARY 25 - MARCH 1

SINCE 1918

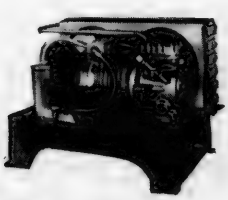
Copeland REFRIGERATION *CORPORATION, Sidney, Ohio*



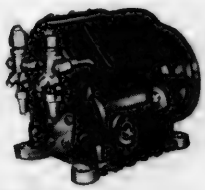
BELT-DRIVEN CONDENSING UNITS . . .
Superior—engineered for every refrigeration need.



COPELAWELD
Heavy-duty performance at low current consumption.



COPELAMETIC
the accessible hermetic . . . The industry leader for rugged dependability.



AUTOMOTIVE AND TRUCK COMPRESSORS . . .
Designed for the critical needs of truck and auto air conditioning and refrigeration.

CARRIER ANNOUNCES A NEW SOURCE OF LOW-COST HEAT

Heat Diffusers, Direct Fired, a complete heating system in a single package

Here from Carrier is a new source of low-cost heat for stores, garages, schools, factories, churches, warehouses: Heat Diffusers, Direct Fired, for use with gas or oil.

These compact Heat Diffusers are completely self-contained: a stainless-steel combustion chamber, burner, heat interchanger, air handling equipment and controls are all assembled in a single casing.

They cut heating costs three ways:

1. They cost less to own because they do the job of several smaller type units.

2. They cost less to install because no central boiler is required, saving piping costs.

3. They cost less to operate because of their high efficiency—at least 80% of the fuel consumed is converted into usable heat.

Further advantages are great flexibility and ease of installation. They can be floor mounted, ceiling mounted, wall mounted, or installed with ducts. They are pre-wired and factory-fired; when electrical and fuel connections are made and the stack vented, a unit is ready to operate. Available in 10 sizes, 300,000 to 2,000,000 Btu's.

For your copy of a new bulletin describing this new heater in detail, call the Carrier Manufacturer's Agent listed in your Classified Telephone Directory under "Heaters—Unit." Or write Carrier Corporation, Dept. UH, Syracuse, New York.

Carrier

industrial heating • air conditioning • refrigeration

Yes...

I would like to receive complete data. ( )

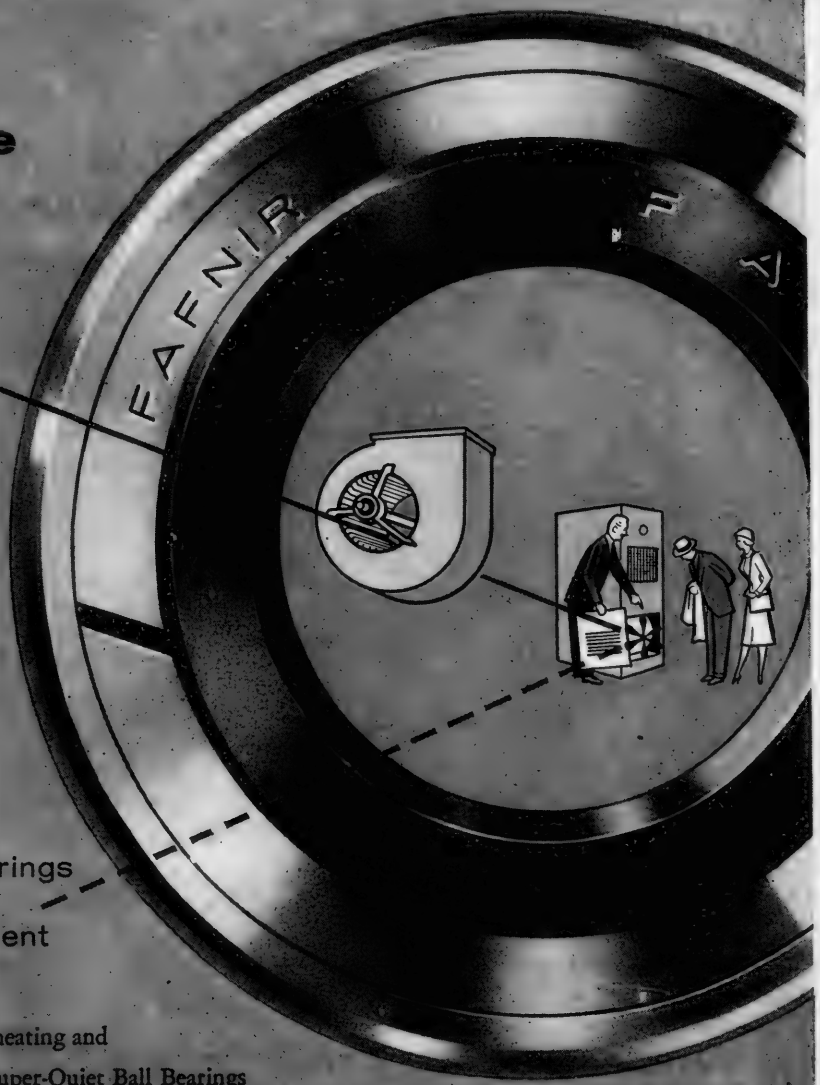
Or, just send me items checked. ( )

drayer-hanson

3301 Medford Street • Los Angeles 63, California

(Division of National-U.S. Radiator Corporation)

How to produce a QUIET revolution... and win more sales!



Specify Fafnir
Super-Quiet Ball Bearings
for heating and
air-conditioning equipment

Designed expressly for residential heating and air-conditioning equipment, Fafnir Super-Quiet Ball Bearings feature balls and races specially finished for quiet performance.

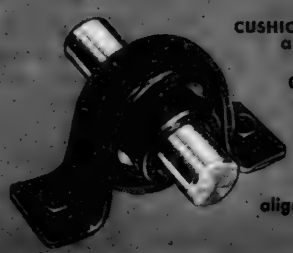
These advance-design bearings offer an inexpensive way to reduce noise, increase sales appeal. Prelubricated with factory-filtered grease and equipped with Plya-Seals to keep grease in and dirt out, they never need relubrication or maintenance. Moreover, Fafnir Super-Quiet Ball Bearings, with self-locking collars, are easiest of all to install... lock securely to the shaft with a twist of the wrist.

Available in sizes to fit brackets using popular-size sleeve bearings, Fafnir Super-Quiet Ball Bearings come mounted in electric current-conducting rubber cartridges and rubber-cushioned pillow blocks. Send for bulletin containing complete information and specifications. The Fafnir Bearing Company, New Britain, Conn.

FAFNIR
BALL BEARINGS
MOST COMPLETE LINE IN AMERICA

RCSM TYPE RUBBER CYLINDRICAL CARTRIDGES are designed to be interchanged with other makes of ball bearing rubber-cushioned cartridges . . . feature Fafnir Super-Quiet Ball Bearings.

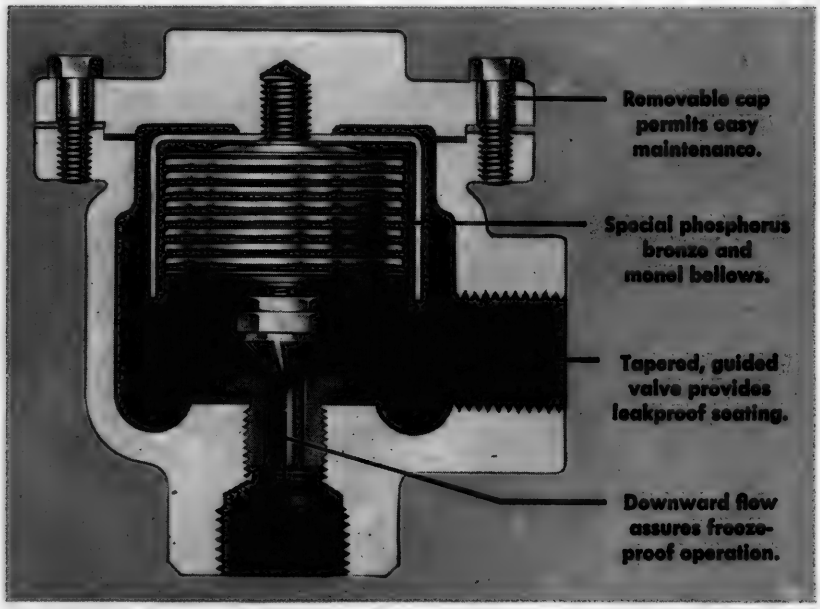
RCR TYPE RUBBER CYLINDRICAL CARTRIDGES, also equipped with the Fafnir Super-Quiet Ball Bearing, are designed for interchanging with sleeve bearing mountings.



RPB TYPE RUBBER-CUSHIONED PILLOW BLOCKS, a completely packaged, low cost Fafnir Super-Quiet Ball Bearing unit, features compact, two-piece, pressed-steel housing . . . is quickly mounted, affords unrestricted initial alignment in all directions.

ANDERSON PRESENTS...

THE GREATEST ACHIEVEMENT IN INDUSTRIAL THERMOSTATIC STEAM TRAPS


Removable cap permits easy maintenance.
Special phosphorus bronze and monel bellows.
Tapered, guided valve provides leakproof seating.
Downward flow assures freeze-proof operation.

NEW QUIK-FLEX

THERMOSTATIC STEAM TRAPS WITH THE FREEZE-PROOF GUARANTEE!

● Entirely new in design and engineering, here is one of the greatest achievements of all time in industrial thermostatic traps. Anderson's trap designers have engineered a trap that can be *guaranteed freeze-proof*—used with utmost safety in any outdoor or open-sided building installation. In addition, they are made with Anderloy valve and seat designed especially to resist scoring! Specify freeze-proof Quik-Flex Thermostatic Steam Traps.

THE V. D. ANDERSON COMPANY
division of International Basic Economy Corporation • 1973 West 96th Street, Cleveland 2, Ohio

Please send Bulletin 257 describing your new Quik-Flex Thermostatic Steam Trap with the Freeze-Proof guarantee.

Name _____

Company _____

Address _____

City _____ *Zone* ____ *State* _____

QUALITY STEAM TRAPS SINCE 19[illegible]

for FUME

CONTROL

install

FLEXAUST® HOSE

Made of strong neoprene coated cotton or nylon fabrics spiral wire reinforced.
For *all* kinds of fume and dust control, and ventilation uses.
Extremely flexible, durable, and lightweight.
Exceptionally easy to cut, install, connect, reuse, and relocate.
Sizes 1¼" thru 36" i.d.

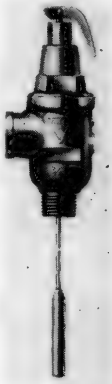
Write for details today
Distributors in all principal cities

THE FLEXAUST COMPANY
Dept. HV-2
[illegible] PARK AVE NEW YORK 17, N. Y.

(*Continued from page* 156)

Relief Valves

Two new ASME rated temperature and pressure relief valves known as the N40 Series having ¾-in. male inlet and female outlet connections are announced by Watts Regulator Co., Lawrence, Mass. The series is comprised of two models, No. N40L, lever type with short thermostat, and No. N40XL, lever type with extension thermostat. These valves have a steam pressure discharge rating of 1,028,000 Btu per hr with valve set at 125 psi and an AGA temperature water rating of 850,000 Btu per hr.



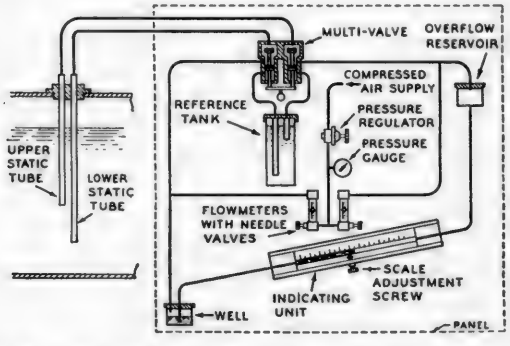
This series in addition to the company's original ASME rated 140-240 Series provides a complete range of sizes, connection styles, and ratings in order to facilitate almost any installation requirement.

The original 140 Series has also been expanded to offer a wider selection of models including short thermostats and fixture connections for specified requirements.

More information? Circle Item 20 on postcard, page 125.

Specific Gravity Indicator

Remote reading specific gravity indicator No. 1561 is announced by Petrometer Corp., Long Island City, N. Y. A direct-reading, all-automatic instrument, it has an accuracy of .001 sp gr. units, with interpolation to .0005 sp gr. units.



All functional parts of the indicator are mounted on the rear; adjustments are made from the front, of the instrument panel. Parts are accessible by swinging open the hinged panel door. If desirable, the entire front panel can be removed from the indicator cabinet by a simple ¼ turn of four fasteners. Three transmission lines terminate in a triple terminal and are easily connected or disconnected.

The company's specific gravity indicator operates on the principle of a differential bubbler and has two static pick-up tubes (one a pre-determined distance above the other) within the vessel containing liquid to be tested. Two additional tubes are installed in a small reference tank within the instrument. This tank is filled with a liquid of known specific gravity, which is selected to be as close as possible to the tested liquid. Both sets of static tubes terminate in a multi-port valve which can connect either set of tubes with the indicating system.

The indicating system consists of a combined vertical and inclined manometer equipped with an adjustable well and safety overflow. It has two identical bubbler generators, each consisting of a flowmeter and needle valve, one for each set of static tubes.

More information? Circle Item 21 on postcard, page 125.

Portable Potentiometer

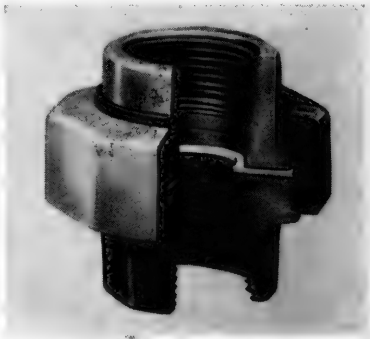
Thermo Electric Co., Inc., Saddle Brook, N. J., announces a portable pyrometer indicator, called the Minimite. It weighs under 4 lb, measures 4 x 5 x 6 in., and its scale is 23 in. long.

Designed as a dual purpose instrument, it can be used to measure temperature directly when connected to a thermocouple, or as a standard comparison instrument against which to check other millivoltmeter and potentiometer-type instruments. Accuracy is ¼% of scale range. Available with the unit are 15 standard, double-range scales.

More information? Circle Item 22 on postcard, page 125.

Insulating Forged Steel Unions

Insulating forged steel unions, used to prevent electrolytic corrosion due to flow of electric current along pipe lines, are now available from W-S Fittings Div., H. K. Porter Co., Inc., Roselle, N. J. The unions are manufactured in 3000 lb class, sizes ¼ to 3 in. in screw-end and socket-welding types.



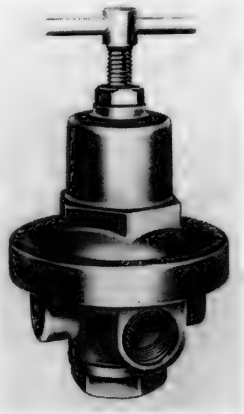
The tailpiece, thread piece and nut are drop forged from carbon steel in accordance with ASTM material specification A-105 Grade 2. The insulating sleeve separating the tail piece and nut is made of fabric-reinforced phenolic resin, noted for its high strength, toughness and chemical resistance. The gasket which seals the union joint, and which is in contact with the fluid in the pipe, is made of Teflon. It is completely inert to most chemicals, has good heat resistance and insulating properties.

More information? Circle Item 23 on postcard, page 125.

(*Continued on next page*)

High Capacity Pressure Regulator

A high capacity pressure regulator for air, gases, and liquids is announced by Generant Engineering Co., Newark, N. J. The ¼-in. pipe size regulator is only 2 3/16-in. in diameter and 3⅝-in. high but it has a capacity many times that of larger units. For example with an inlet pressure of 200 psi and a reduced pressure of 80 psi at no flow, the flow can be increased to 80 cfm of free air with a drop in the reduced pressure of only 2 psi.

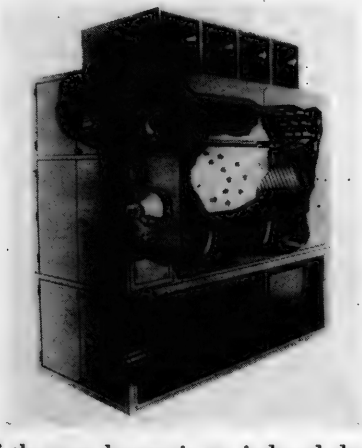


These are not pilot type regulators but employ a direct diaphragm operated valve. The large flows are the result of a design improvement which causes the valve to open wider as the flow increases thus maintaining the regulated pressure at the higher flows. Other non-piloted regulators maintain the same valve opening at all flows resulting in a pressure drop across the valve which increases with the flow causing a considerable drop in the regulated pressure as the flow increases.

More information? Circle Item 24 on postcard, page 125.

Space Heaters Feature Dual Firing

The 1957 series of Counterflo space heaters, developed by Dravo Corporation, Pittsburgh, Pa., has incorporated features to give increased operating efficiency through greater air-heat volumes and reduced fan horsepower requirements. The new models are available in nine sizes ranging from 250,000 to 2,000,000 Btu per hr output capacity.



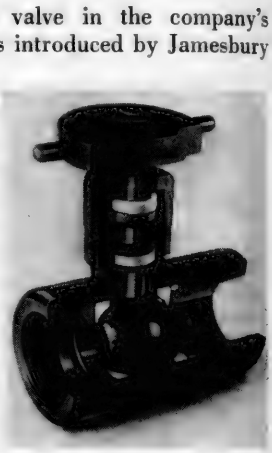
Heart of the new heater is an induced draft Pyro-Jet burner suited for gas, light oil, heavy oil, or combination gas and light oil firing. Instant fuel changeover, effected by a manually or thermostatically operated switch is a unique feature of the combination fuel models. The induced draft principle of the burner results in stabilized pressure conditions within the combustion chamber. The heavy duty exhauster fan draws combustion air in at the same rate spent gases are drawn out and forced up the stack. There is no problem of delicate balance between two fans, one pushing air in at the burner, and one pulling spent gases out at the exhaust breeching.

All models are equipped with forwardly curved, slow speed, double inlet fans with shafts sized to provide an ample safety factor. Single fan units are used in heaters of 250,000 and 350,000 Btu per hr output capacity, while dual fans are installed in the larger size heaters. Fan motor requirements, based on a 75 deg F temperature rise, range as low as ½ and up to 7½ hp, depending upon the size of the heater. Air-heat ratios range from 11,000 to 16,000 cfm per 1,000,000 Btu per hr output. Tests show the heaters, regardless of size, operate at a minimum efficiency of 80%.

More information? Circle Item 25 on postcard, page 125.

Polyvinyl Chloride Ball Valve

An all polyvinyl chloride valve in the company's double-seal ball valve design is introduced by Jamesbury Corporation, Worcester, Mass. The new valve combines the design principle with a new material for handling corrosive and other difficult fluids. Sturdy construction permits use in many plastic or metal piping systems for either vacuum or pressure service.



Full flow, quarterturn shut-off, with thousands of leak-tight cycles and no maintenance are outstanding features. Valve seats are easily replaceable. Rating is 150 psi at ambient temperatures and 50 psi at 130 deg F.

Sizes ½ to 2 in. in screwed ends are available. Flanged and weld end types will follow.

More information? Circle Item 26 on postcard, page 125.

Flush-Mounting Switch Case

A flush-mounted case for housing several series of its time switches is available from International Register Co., Chicago, Ill. All enclosures and wiring are concealed in the wall for a finished appearance. It is UL-approved.

Case is available for use with TS60, standard *on-off* switches, TS66, which permits operation on selected days, and T670, for short-interval timing of 5 to 60 min.

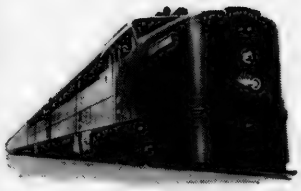
Flush mount case is made of heavy-duty (.063-in.) formed steel in a grey crackle finish with hinged door that may be had with or without a key lock. Five knockouts, one on each side and three on the bottom, provide access to terminals.

More information? Circle Item 27 on postcard, page 125.

(*Continued on page* 164)

SINCE 1888 ALCO Has Said:

"Steam Supply by B&W"



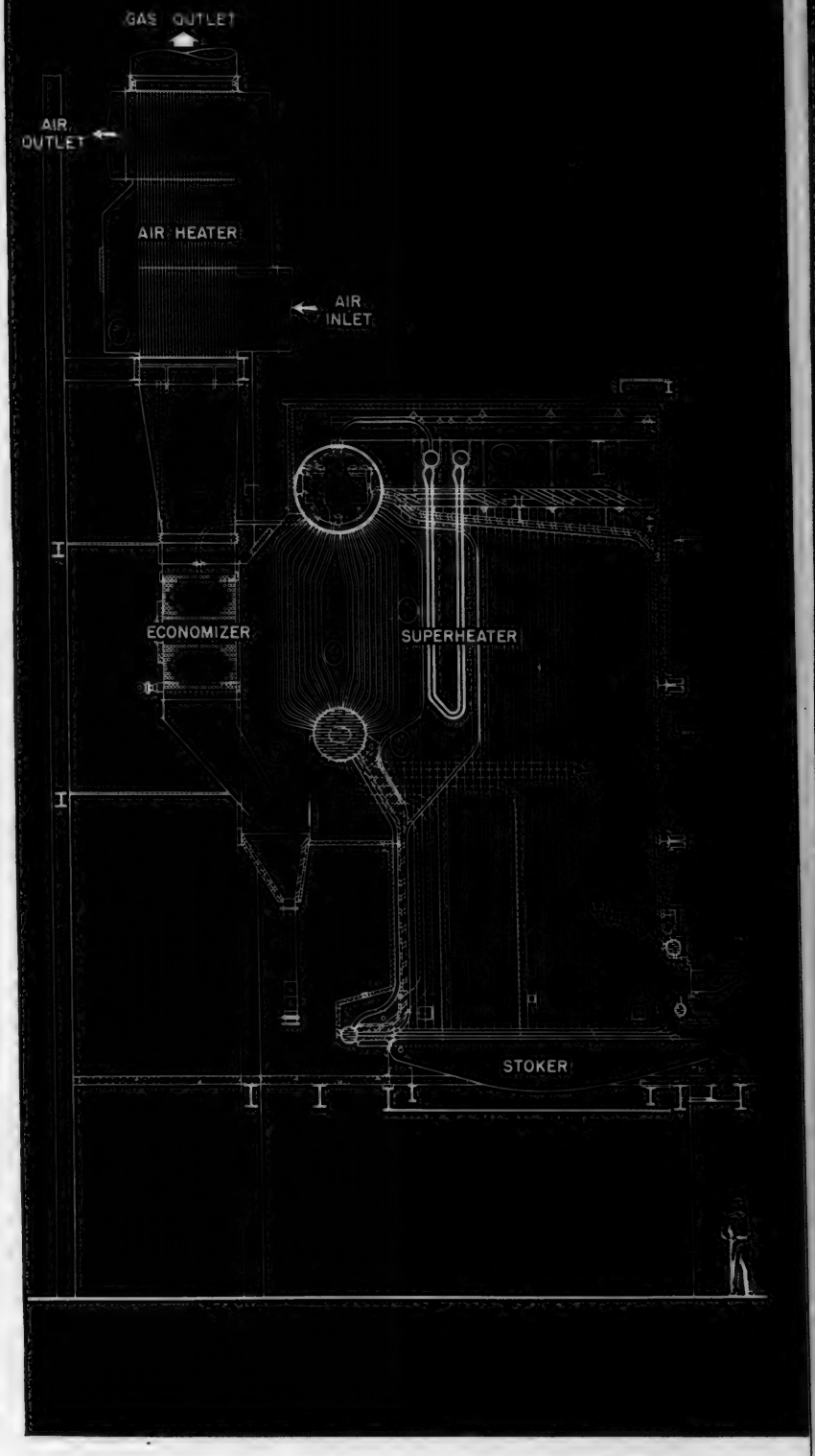
Back in 1888, when the *American Type* locomotive was setting speed records on passenger runs, B&W sold its first boiler to Schenectady Locomotive Works, predecessor of ALCO Products, Inc., to serve the plant.

In January 1955, two more B&W Two-Drum Stirling Boilers went on the line at the company's Schenectady plant. They are providing 100,000 lb of steam per hour for heating, for driving plant auxiliaries, and for some power generation. They bring the number to 40 B&W boilers in ALCO and its predecessors' plants.

What's Interesting about these two latest B&W boilers at ALCO is that they have operated at higher efficiencies than the design contract specified. To ALCO, with its long experience with B&W boilers, this was no surprise.

Long Range, Sustained economy—the product of the top level engineering design found in every B&W boiler—has become something to be expected by long time B&W customers.

More and more manufacturers, in the widest variety of lines, have learned, over the years, to depend upon B&W for an efficient, dependable source of steam. Whatever your steam needs may be—for heating, processing, or power generation—B&W engineers are ready to give you counsel, with nearly a century of steam generation experience behind them. The Babcock & Wilcox Company, Boiler Division, Dept. AHV-2, 161 E. 42nd St., New York 17, N. Y.



BABCOCK & WILCOX

B&W

BOILER DIVISION

G-771

(*Continued from page* 162)

Water Vent Valves

A No. 78 high pressure water vent, designed for high pressure returns of water systems and high pressure process applications, is announced by Hoffman Specialty Mfg. Corp., Indianapolis, Ind.

This new member of the company's vent valve line features a cast brass body, steel copper-clad float, and ¼-in. drain tube fitting, see illustration, for vented moist air. Designed to withstand hydrostatic pressures of 450 psi, the valve gives positive venting at pressures up to 150 psi. Connections are ½ in., female, and ¾ in., male.

This vent as well as the No. 79 vent valve, for operating pressures up to 75 psi, may be used in conjunction with the company's Skirlvent, a cast iron 1¼ or 1½-in. pipe size fitting which centrifugally separates air and water before the venting device at air accumulation points in the water system.

Also new is the company's No. 790 water vent which is designed for venting convectors, baseboard, and wall radiation equipment where operating pressure does not exceed 30 psi.

More information? Circle Item 28 on postcard, page 125.

Dial Gives 3 Points at One Time

One reading of the present temperature on the maximum-minimum stainless steel stem thermometer manufactured by Pacific Transducer Corp., Los Angeles, Calif., gives as well both the maximum and minimum temperatures since the last reading.

Two ancillary indicators are manually set against the high and low sides of the indicating pointer by means of a knob located in the center of the glass window. The maximum-minimum hands then move up and down the scale, remaining at the extreme points until manually reset.

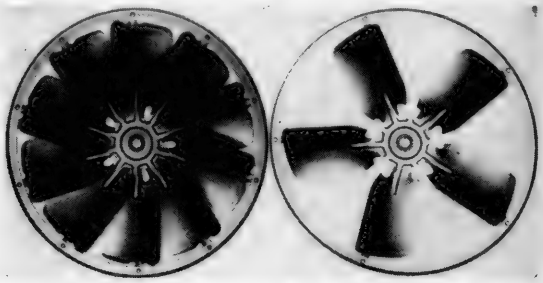
Knob is hermetically sealed on the window, so that no fumes or moisture can leak through. Stainless steel stems withstand corrosion and can be used in liquids and gases, no preheating being required for use in hot materials.

Thermometers are of the direct-drive, bimetallic type, without gears or linkage. They are accurate to 1% over the entire scale, and are available in 7 ranges, Fahrenheit and Centigrade, with faces of 2 or 3-in. dia and stems from 3 to 86 in.

More information? Circle Item 29 on postcard, page 125.

Axial Depth Reduced One Inch

A series of 10-bladed slinger-ring fans, Model C13-10, announced by The Torrington Mfg. Co., Torrington, Conn., is designed to save about 1 in. of axial depth in room air conditioners while matching air-flow performance of the commonly used 6-bladed fans. Company's



engineers claim that unit cost can be lessened by the reduced unit depth permitted by this fan. A 1-piece, 5-bladed slinger-ring series, Model C13-5, is also available for applications where low initial cost is of prime importance.

Both series have a slinger ring outer diameter of 14¼ in. and are 1-19/32 in. in axial depth (other pitches are available upon request). Several slinger ring positions are available. The blades and slinger ring are aluminum; and the hub may be aluminum, steel, rubber-bushed, or rubber bonded. Finishes are mill-finished on aluminum and zinc plating on steel. All fans are statically balanced.

More information? Circle Item 30 on postcard, page 125.

Heat Resistant Shaft Seal

A new, self-contained, compact seal for use in all types of jet water pumps, oil pumps, reduction units or appliances is introduced by The Garlock Packing Co., Palmyra, N. Y. It can be used on any rotating shaft to seal any liquids that will not attack the brass metal parts. The seal has been designated the BA12A-10.

The face of the seal, capable of withstanding high face loading and heat, is manufactured from filled true carbon to prevent porosity. Heretofore, faces on this type of seal have been made of molded plastic and the resultant flash marks in some instances have led to seal failure. Also the fired carbon withstands greater temperatures than the molded plastic component, the manufacturer claims.

The seal is recommended to operate against pressures up to 100 psi, and it is available for ⅝ and ¾-in. dia shafts with general operating limitation of 212 deg F with shaft speeds up to 1000 fpm.

More information? Circle Item 31 on postcard, page 125.

(*Continued on page* 166)

Horne's main store in Pittsburgh has 28 filter stations with banks ranging from 10 to 48 filters each. Pittsburgh Glasfloss Filters are used exclusively. The system was installed in 1937.

Howard F. Burrell, Chief Engineer, reports that Pittsburgh Glasfloss Filters are easy to handle, soft and light weight; and that this Fiber Glass filter does not splinter or shred.

"We effected a direct unit saving of 13% by switching to Pittsburgh Glasfloss Air Filters"

—says Howard F. Burrell, Chief Engineer
JOSEPH HORNE CO., Pittsburgh, Pa.

"The filters we previously used in our store-wide air conditioning system would shred and stick to fingers and clothing when handled," reports Mr. Burrell. "They were not uniform in quality and their performance was erratic.

"We switched to Pittsburgh Glasfloss Filters in February, 1956. We found Glasfloss Filters much easier to handle. They are lighter in weight and safer, too; this Fiber Glass does not splinter or shred. What's more, Glasfloss lasts longer, making it possible for us to effect a 13% saving over filters previously used.

"From an engineering point of view, we consider Glasfloss the most practical, economical and dependable filter possible to obtain for our system!"

Glasfloss Filters Will Give You Best Results, Too!

Pittsburgh Glasfloss Filters are made of fine, soft Fiber Glass, which provides greater dust-collecting areas without interfering with the air flow. They are moisture proof and fire resistant. Glasfloss Filters will give you top service from your air conditioning system, help you cut costs.

Contact your nearest Glasfloss Distributor or Pittsburgh Plate Glass Warehouse. *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pennsylvania.*

PITTSBURGH GLASFLOSS FILTERS ARE A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia and St. Louis

FIBER PG GLASS

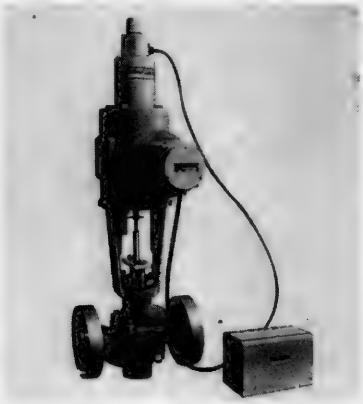
PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

(*Continued from page* 164)

All-Electric Actuator

An all-electric actuator is a recent development of Conoflow Corporation, Philadelphia, Pa. Series D actuator is a proportional positioning device for use in conjunction with modern electronic control systems. A feature is that it requires no intermediate pneumatic or hydraulic operating fluids. The unit combines the desirable features of an all-electric system with the mechanical simplicity and ruggedness of commercial pneumatic actuators.



While only the first in a projected line of all-electric actuators, the present model is suitable for immediate application on valves and other equipment. These include single-seated (illustrated) and double-ported control valves, butterfly valves, proportioning pumps, and mechanical and electrical speed controllers. The actuator is also applicable for many complete all-electric systems where other modes of control have not proved practical.

The actuator has a stroke length of ¼ to 2 in. with a stem speed of 4 inches per minute at the maximum rated output of 500 lb of thrust. It is both compact and lightweight; complete assembly of motor and yoke stands only 25-in. high and weighs less than 35 lb. It can be mounted in any position, is immune to normal vibration.

More information? Circle Item 32 on postcard, page 125.

Plastic Tubing in Two Series

Polyethylene tubing in sizes from ¼ to 1 in. is produced by Franklin Plastics, Inc., Franklin, Pa., makers of Dur-X plastic pipe and fittings. Guaranteed against rot, rust, and corrosion, tubing is available in two grades, translucent, known as Supreme T, and plain black, identified as Supreme B.

Translucent tubing, which is not recommended for applications involving exposure to continuous sunlight, is designed for use in home evaporative coolers, radiant heating systems, in chemical, medical and pharmaceutical plants, food processing operations, and is safe for drinking water use.

Plain black tubing is intended for more rugged jobs such as transmitting brine solutions for ice skating rinks, for air and gas lines, conduit or vent lines.

Company's ½-in. fittings can be used with ¾-in. tubing; ¾-in. fittings for 1-in. tubing. For tubing of smaller size brass fittings are recommended.

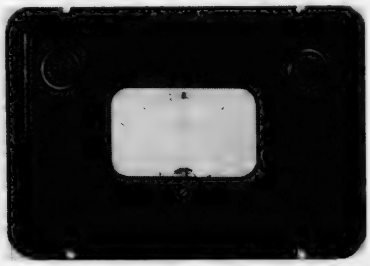
Standard coil lengths are 100 and 500 ft, but special lengths will be furnished upon request.

More information? Circle Item 33 on postcard, page 125.

Smoke Indicators and Recorders

Production of an improved Type EHA smoke indicator and indicator-recorders is announced by Brooke Engineering Co., Philadelphia, Pa.

Indicator case is designed for either flush or surface mounting. A red and green warning light as well as a 4½-in. smoke meter are provided. Warning lights indicate to the boiler operator that the smoke is out of bounds and the large smoke meter indicates the color of flue gas at all times.



Unit is operated by a photo electric cell mounted at the boiler outlet and smoke density is translated to a meter reading at a remote location without any time lag. A hermetically-sealed time delay contact is provided to sound an audible alarm, if desired, a few seconds after the red light comes on warning the fireman of excessive smoke. This time delay prevents occasional puffs of smoke from sounding the alarm.

Two types of indicator-recorders are offered. Both have all the features of the indicator. The violation indicator-recorder records the length of time the smoke has exceeded the set density. The density indicator-recorder continuously records the degree of density from clear to black. This recorder has a 10-in. fan-type indicator as well as red and green warning lights.

More information? Circle Item 34 on postcard, page 125.

Conditioners Use Old Pipes

Year-round conditioning from the same piping system with its air conditioning units is promised by Airtherm Mfg. Co., St. Louis, Mo. In four series, from ½ to 2-ton nominal cooling capacity, they are for cabinet or concealed-type installations, floor or ceiling.

In old buildings that use steam or hot water systems, the company states, the same pipes and central system may be used by adding insulation and a chiller.

Units' noise level is suitable for hospitals. Motor and fan assembly remove in one piece. One piece front panel makes possible recessed installation and quick fastening to cabinet without tools.

More information? Circle Item 35 on postcard, page 125.

(*Continued on page* 168)

Specify RECO

Tampa Electric Co., Operations Center, Tampa, Fla.
Architect-Engineers:
Stone & Webster Engineering Corp., Boston, Mass.
Reco Representative—W. B. Parson Co., Needham, Mass.

TECO Specifies RECO for hot water at new operations center

Tampa Electric Company's new Operations Center serves Florida's "Center of Activity." And in the center of this huge operations headquarters, a new RECO corrosion-resistant, copper-silicon storage heater serves 2300 gallons of piping hot water per hour. As always, RECO meets round-the-clock demands with minimum maintenance.

Put top quality and performance, fair price and quick delivery into *your* specifications—SPECIFY RECO.

Write today for free catalogs plus name of RECO representative nearest you to:
Dept. N, Richmond Engineering Co., Inc., 7th & Hospital Sts., Richmond 5, Virginia

RICHMOND ENGINEERING CO., INC.

(*Continued from page* 166)

Earth Boring Machine

Boring speeds of their latest horizontal earth boring machines have been increased as much as forty per cent according to the manufacturer, Hydrauger Corp., Ltd., San Francisco, Calif. This is said to be the result of re-designing and incorporation of the latest high-torque Ingersoll-Rand multi-vane air motors. This is a special motor built to bore and cut through the toughest tree roots encountered while boring underground for pipe and conduit installation; and for soil drainage.

The operation of the device is classed as wet hole boring. Water, forced through the hollow steel boring bar sections cools the cutting bit, washes cuttings from the hole and muds the hole walls. The resulting longer bit life and faster boring speeds save time in all types of earth formation. The use of air power below the surface is said by the company to be less hazardous to workers than electric or gasoline power plants.

The straight, open hole produced by the machine allows the installation of many kinds of pipe; even the new asbestos-cement types with O-ring couplings are easily snubbed into place. Now available in several new sizes and modifications, the larger machines bore holes of 2 through 24-in. dia. for distances up to 250 ft.

More information? Circle Item 36 on postcard, page 125.

Draft Regulators

A line of residential and heavy-duty commercial draft regulators, called RD (Red Dot), is in production at Wm. Steinen Mfg. Co., Newark, N. J.

Heavy-duty commercial regulators are manufactured in 12, 14, 16, 18, 20, 24, 28 and 32-in. sizes, equipped with a universal mounting collar, for either screw or strap type mounting. These models feature custom-built accuracy, with gate balance locked in at the factory. Acrolok, as this feature is named, is tamper-proof and results in quicker, more sensitive, and more reliable vane reaction to draft change in the chimney, the company states. Also, it compensates for the variation in weight of steel from sheet to sheet and eliminates the need for other parts to achieve true balance.

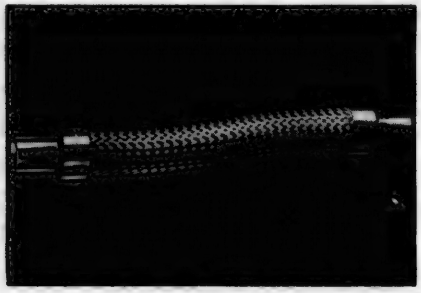
The 12 to 32-in. models have a compound draft setter, with minimum safety setting. In practice, the two weights move together, setting draft and automatically stabilizing balance. As in the smaller sizes, double non-jamming gate stops contribute sensitive, accurate gate performance. The gate is suspended on two-piece, permanently mounted hardened steel non-binding pivot pins with built-in, full-size side thrust bearings. Leveling at time of installation is simplified by true line level edges on permanently mounted side brackets.

Residential draft controls are available in 4 basic combination sizes for use with 6 flue pipe sizes from 5 through 10 in. The basic regulator sizes are 6, 7, 8 and 9 in. Each is designed for application to a flue pipe of its own identical dimension, as well as for use on pipes 1 in. smaller and 1 in. larger.

More information? Circle Item 37 on postcard, page 125.

Flexible Hose Absorbs Vibration

Designed by Cobra Metal Hose, Chicago, Ill., for use in air conditioning and refrigerating units, this flexible coupling absorbs vibrations from pulsating sources,



thereby eliminating the noises that develop from a solid pipe connection.

The noise absorbers are individually cleaned, tested, inspected, thoroughly dried and sealed at each end to protect against condensate. They are then individually packaged for even further protection. The couplings are made of seamless bronze tubing and have a bronze wire braid sleeve. The ends are brazed with the braid and flexible tubing to give a unitary construction for longer life and greater dependability.

More information? Circle Item 38 on postcard, page 125.

Introduces Valve Line

Series 200 fast-acting, pneumatically operated industrial valves are introduced by Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

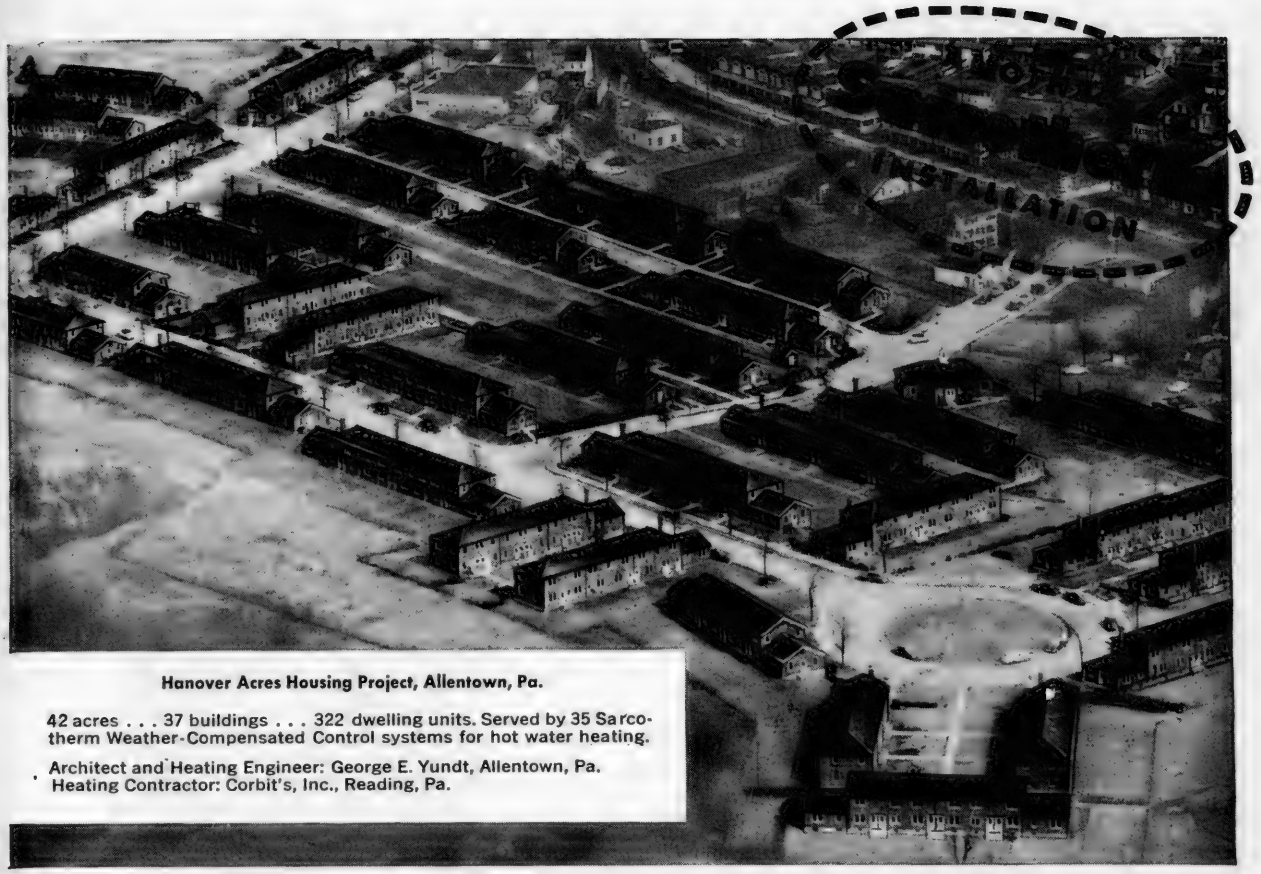
Available in two models, one a piston-operated throttling valve and the other a diaphragm-operated two-position valve, both are designed to handle such gases as air, helium, nitrogen and argon, at pressures up to 10,000 psi. The valves allow pressure drops as high as 6,000 psi under flowing conditions. They work at temperatures from —40 deg to +400 deg F. Wider temperature variations are available in special versions.

Throttling valve is 15⅜ x 13 5/32 in.; two-position valve, 10½ x 11⅝ in. despite their small size, stainless steel bodies make them suited for heavy duty. They have split-body construction with clamped-in seat ring.

Both valve types are also available in hand-operated models with the same body construction.

More information? Circle Item 39 on postcard, page 125.

(*Continued on page* 170)



Hanover Acres Housing Project, Allentown, Pa.

42 acres . . . 37 buildings . . . 322 dwelling units. Served by 35 Sarcotherm Weather-Compensated Control systems for hot water heating.

Architect and Heating Engineer: George E. Yundt, Allentown, Pa.
Heating Contractor: Corbit's, Inc., Reading, Pa.

42 acres of comfortable heating ...for 16 years!

Provided by 35 Sarcotherm Weather-Compensated Control Systems

Here's the Test...35 Sarcotherm Systems...16 years on the job...serving 322 dwelling units at Hanover Acres Housing Project, Allentown, Pa. That's a tough test of heating control dependability and economy!

And here's the Result!...The Housing Authority of the City of Allentown reports...throughout the entire 16 years these Sarcotherm Weather-Compensated Control Systems for hot water heating have given trouble-free service and provided money-saving, comfortable heating.

Dependability-plus...that's one of the major reasons Sarcotherm Systems have been installed in many important projects including Hanover Acres and Beardsley Terrace Housing, Bridgeport, Connecticut.

For undivided responsibility on your installations, specify and order from one "Complete Line" source...SARCO-SARCOTHERM.

Write for catalogs. Sarcotherm Controls, Inc., Empire State Building, New York 1, N. Y.

ADVANTAGES OF SARCOTHERM SYSTEMS

On-the-job help—Sarcotherm engineers cooperate in preparing working drawings and wiring diagrams for each job. Also assist in supervising the installation.

Easy to maintain—simple, trouble-free design, fewer parts.

Easy to adjust—to any desired setting.

Complete Control Systems from Sarcotherm include all accessories such as control panels, thermostats, radiator valves, balancing fittings, steam traps, domestic hot water controls, etc.

4008-B

Sarcotherm

AN AFFILIATE OF SARCO CO., INC.

Weather-Compensated control systems for steam, hot water and radiant heating

(*Continued from page* 168)

Torque Controls Tube Expander

A dial incorporated into the Model C Torq-Air-Matic, a new air-powered tube-expander drive and control developed by Thomas C. Wilson, Inc., Long Island City, N. Y., provides the control necessary for precise boiler-tube rolling. The operator has but to set the desired torque (in foot-pounds) on the dial and start the rolling

operation; when the desired torque is obtained, the expander automatically stops rotating. Joint tightness is always uniform, regardless of tube-sheet hole variation. Guess work is taken out of tube expanding because the operator does not have to depend on expander resistance, motor sound, or feel to determine correct expansion. This feature makes the tool easy to use, even by untrained personnel, and eliminates over- and under-rolling.

The device is designed for a wide range of boiler tubes, from 1 to 2½-in. OD. Similar in principle to the Model A announced earlier this year, the new model produces 75 ft-lb pounds of torque, powerful enough to roll 3 in. No. 10 gage tubes in a ⅝-in. thick sheet. It is a completely integrated one-piece device. With an air base as the only external connection, the unit is not cumbersome, and there are no delicate auxiliary parts that might be broken.

The tube expander weighs 26 lb, has an over-all length of 18 in. and a free speed of 200 rpm. A quick-acting, snap-on mandrel driver facilitates changing expanders.

More information? Circle Item 40 on postcard, page 125.

Expands Air Conditioning Line

Residential system air conditioning installations will be simplified by use of a residential cooling load chart and an expanded line of conditioners in 16 sizes, according to Bryant Mfg. Co., a division of Carrier Corp., Indianapolis, Ind.

Described as the backbone of its line, air-cooled Model 560 has 2 new condensing units and 4 matching coils. A larger sized Model 556, also air cooled, is for cooling small homes or for multiple use in zone cooling larger areas. Cooling coils are made to match the various compressors available. There is a coil for downflow furnaces that fits under the furnace, another that attaches to the plenum on top of the upflow furnace, an S-coil for horizontal ducts, a blower coil that can be installed in existing ducts, and another blower coil that can be suspended and used with or without duct work.

Model 590, water cooled, is redesigned to contain a field-serviceable compressor.

More information? Circle Item 41 on postcard, page 125.

Asbestos-Cement Sewer Pipe

The addition of a new, economical asbestos-cement building sewer pipe to its established line of asbestos products has been announced by Keasbey & Mattison Co., Ambler, Pa. Applications for this sewer pipe exist in both residential and industrial building. Most extensive use of the pipe is expected in short length house-to-street sewer hookups; for example, in connecting residence sewage outlets to septic tanks or nearby municipal sewer lines.

This highly durable asbestos-cement pipe will not corrode or rot and may be expected to remain intact under the soil for an indefinite period of time. It is produced in 13-ft sections, which make possible fewer joints and lower installation cost. Half-size sections, 6.5 ft, as well as a complete line of asbestos-cement fittings, can also be obtained. The pipe is available in 4 and 6-in. sizes.

Adjoining sections of pipe are quickly and tightly joined by a specially designed coupling which makes root intrusions into the pipe impossible because of its close fit. The pipe is very light in weight and a 13-ft section can be handled under one arm by a workman.

More information? Circle Item 42 on postcard, page 125.

Low Silhouette Roof Ventilators

Three new, low silhouette sizes have been added to the Type LSQ roof ventilator line available from Ilg Electric Ventilating Co., Chicago, Ill. The models, ranging in height from 6¾ to 12¾ in., are ideally suited to harmonize with modern institutional, commercial and industrial architectural requirements. Capacities of the new models range from 287 to 938 cfm. Motors in these sizes are shaded pole type, totally enclosed, with permanently lubricated bearings.

More information? Circle Item 43 on postcard, page 125.

(*Continued on page* 172)

WAGNER ELECTRIC MOTORS...THE CHOICE OF LEADERS IN INDUSTRY

National Home Office of the Allstate Insurance Company.

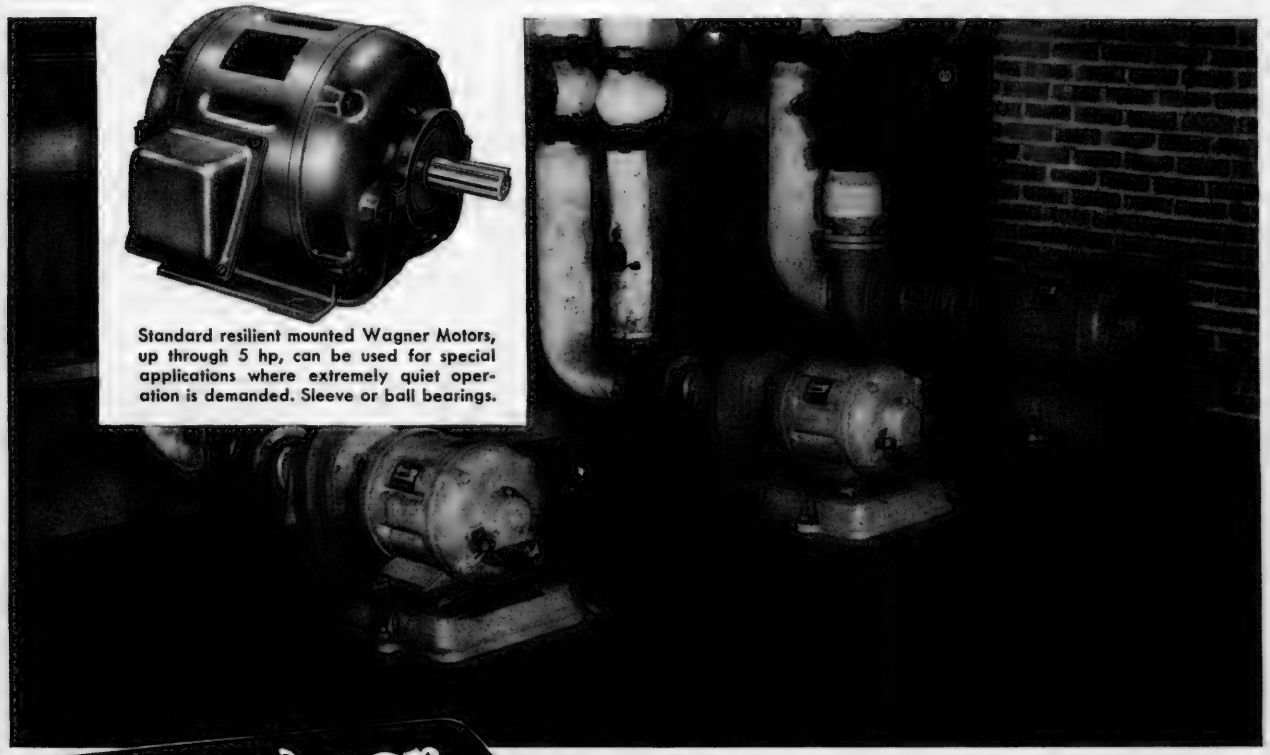
Wagner Motors help B & G Pumps meet their toughest test... QUIET OPERATION!

Circulating pumps used in hot water heating systems must be silent—vibrationless in operation, since they are the connecting links between the boiler room and the structure itself. A prime requirement for quiet pump operation is an electric motor that operates almost silently, yet has plenty of stamina to hold up under years of hard, steady operation.

That's why Bell & Gossett Company used Wagner Motors on the Universal Pumps in the Allstate Insurance Company home office. These quiet-type motors are known for smooth balance and quiet operation.

Perhaps you have a specialized motor application . . . if so, remember, there's a Wagner motor to fit every need . . . a complete line for all current specifications with a wide variety of enclosure types and mountings.

Your nearby Wagner engineer can help you select the *right* motor to meet your specifications. Call the nearest of our 32 branch offices or write us.



Standard resilient mounted Wagner Motors, up through 5 hp, can be used for special applications where extremely quiet operation is demanded. Sleeve or ball bearings.

Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation
6463 Plymouth Ave., St. Louis 14, Mo., U.S.A.

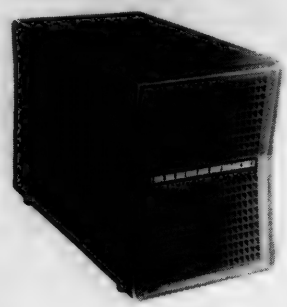
M57-7

See the Wagner exhibit in Booth 1129 at the International Heating & Air Conditioning Exposition in Chicago

(*Continued from page* 170)

Mobile Dehumidifiers

In addition to the company's 1957 Super Model, a completely automatic Custom Model with humidistat that turns unit on and off as humidity changes is offered by Lonergan Mfg. Div., McGraw Electric Co., Albion, Mich. Humidistat dial, located on top, as illustrated, can be set for any desired degree of dryness.



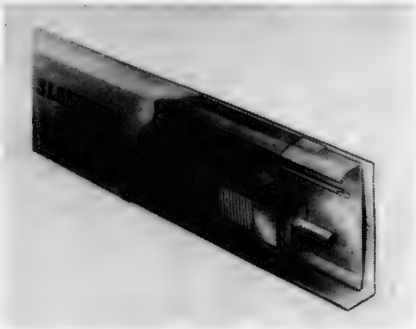
Both models have 1/5 hp capacity compressors, double-banked aluminum condenser coils and 8-in. fans. 6-ft rubber covered appliance cord plugs into any 115 volt a-c circuit outlet. Unit moves easily on large, free-swiveling rubber casters. It is used with double galvanized water collector container or can be connected to drain with standard ¾ in. garden hose fitting. Color is decorator grey with gold trim.

More information? Circle Item 44 on postcard, page 125.

Baseboard Radiator Package

A new ¾-in. baseboard radiator package, whose design permits easier installation and a high Btu output, is announced by the Slant-Fin Radiator Corp., Richmond Hill, N. Y.

Available as a complete package, the baseboard radiator includes heating element, snap-on cover assembly, support brackets, adjustable vane dampers, track expansion clip hangers and splice plate. Packages contain units in 4, 5, 6 and 8-ft sizes. This eliminates on-the-job cutting and minimizes installation time. The one-piece back and top panel is designed for flush or recessed installation.



The heating element's copper tubing is ¾-in. dia, one end of which is flared to speed joining. It has a specially shaped aluminum fin, measuring a 2¾ x 2⅛ in., bent to 2⅛ x 2⅛ in. which utilizes the slant-fin principle for 29% more heating surface per linear foot over standard square fins. Fin edges have an extra angle which creates a stack effect for increased efficiency and unequaled strength. Because of the design, the fins have no sharp edges so that the heating elements are safe to work with.

More information? Circle Item 45 on postcard, page 125.

Steam Meter Keeps Cool

Several design changes in its Model SMDH, now Style 57, Shuntflo steam meter is announced by Builders-Providence, Inc., Div. of B-I-F Industries, Inc., Providence, R. I. It will be ready for delivery prior to the 1957-8 heating season.

The most noticeable change, from outward appearance, is a cooling chamber equipped with exterior cooling fins which provide greater radiating surface to keep the meter cool. This feature, used for over three years in the company's SMKS, has proved to be most advantageous, the firm says.

Meter body now accommodates a concentric orifice for sizing the meter which replaces the previously required by-pass plate and provides improved accuracy by eliminating variable factors influencing the effective flow area of the meter.

It will be possible to interchange orifices with greater facility, and the need for recalibration after each change will be eliminated.

Accuracy of plus or minus 2% of actual rate of flow over a flow range from 10% to 150% of rated capacity is predicted.

More information? Circle Item 46 on postcard, page 125.

Discharges Air at 4 Psig

Designed to fill the gap in pressure range between previous centrifugal blowers and axial blowers, Model 101 centrifugal blower, announced by Turbo Research Corp., Santa Monica, Calif., operates in the 4-psig range.

With drastically reduced noise levels, the company states, blower is constructed with heavy-duty, grease-packed ball bearings in a cast iron housing which forms a rugged base for the aluminum compressor.

Delivered volume with standard inlet conditions is 1300 cfm at 8000 rpm against a discharge head of 4 psig. Performance curves and dimensional data available.

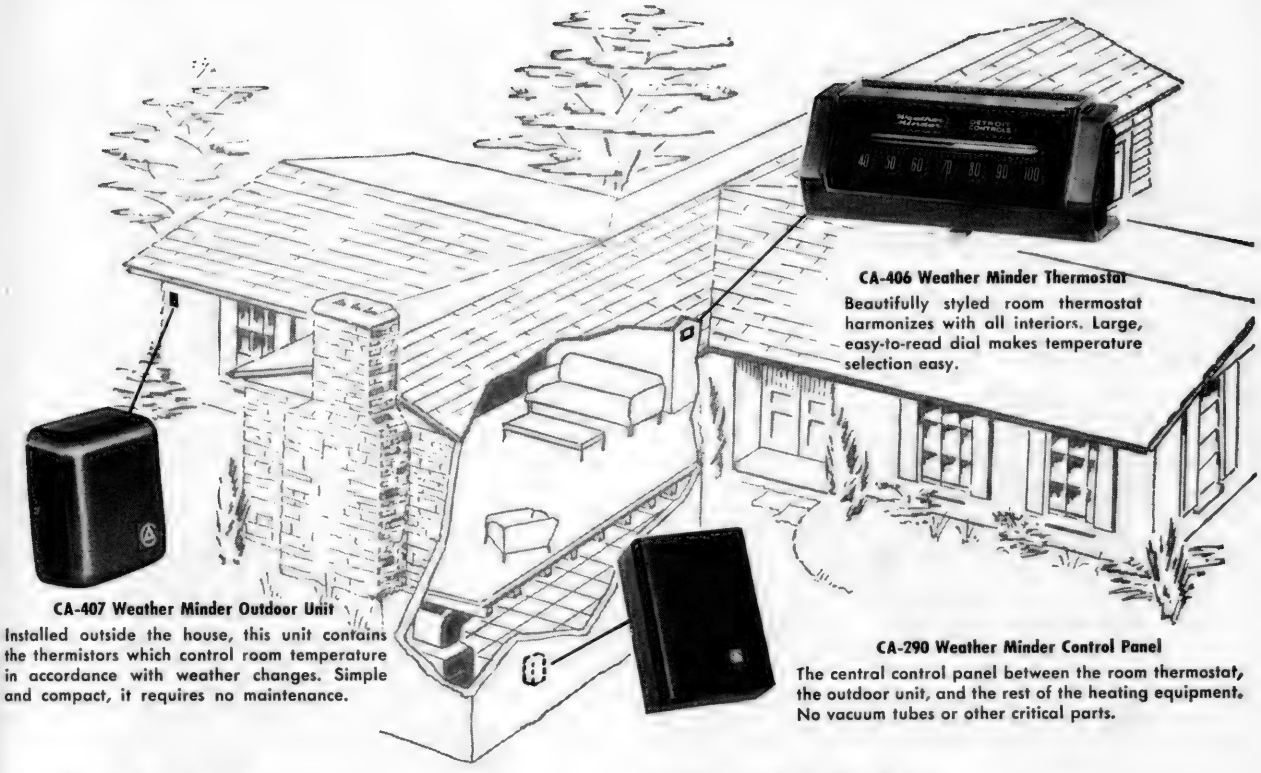
More information? Circle Item 47 on postcard, page 125.

(*Concluded on page* 174)

More Heating Comfort

with DETROIT CONTROLS *Weather Minder*

indoor . . . outdoor Thermistor Control System



CA-406 Weather Minder Thermostat
Beautifully styled room thermostat harmonizes with all interiors. Large, easy-to-read dial makes temperature selection easy.

CA-407 Weather Minder Outdoor Unit
Installed outside the house, this unit contains the thermistors which control room temperature in accordance with weather changes. Simple and compact, it requires no maintenance.

CA-290 Weather Minder Control Panel
The central control panel between the room thermostat, the outdoor unit, and the rest of the heating equipment. No vacuum tubes or other critical parts.

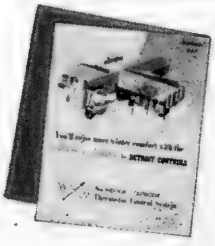
WHAT IT IS

The Detroit Controls Weather Minder is an indoor-outdoor heating control system incorporating thermally sensitive resistors called "thermistors". It is a new concept in temperature control, and offers features not available in other systems.

- Low cost—easy to sell.
- No complicated electronic circuits.
- Easy to install.
- Fully automatic.
- Positive, trouble-free comfort control.
- For any type heating system.

HOW IT WORKS

The Weather Minder System automatically raises indoor temperature as outdoor temperature drops, and conversely, lowers indoor temperature during mild weather. As the outside temperature varies, the outdoor unit alters the control point of the room thermostat, to provide just the right temperature for maximum comfort.



Get all the facts about the Weather Minder System—send today for Bulletin 267.

5900 Trumbull Avenue
Detroit 8, Michigan

DETROIT CONTROLS
CORPORATION
Division of AMERICAN-Standard

Canadian Representatives: RAILWAY AND ENGINEERING SPECIALTIES LTD., Montreal, Toronto, Winnipeg

(*Concluded from page* 172)

Protective Finish for Valves

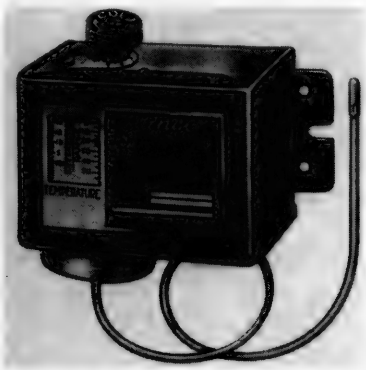
Announcement that its Brite-Kote process is now available in the complete line of bronze plumbing and heating valves for domestic, commercial, and industrial application is made by Hammond Brass Works, Hammond, Ind.

A long-life bronze color-dip applied to valves to produce a protective and decorative finish simulating the bright natural appearance of bronze, it also serves to degrease the exterior of the valve, provides a workable base for painting and pinpoints imperfections in castings during factory inspection.

More information? Circle Item 48 on postcard, page 125.

Control Holds to 2 Degrees

Commercial refrigeration and air conditioning controls, Models 016 and 017, manufactured by Ranco, Inc., Columbus, Ohio, are rated at 15.5 amp full load, 115 and 230 volt a-c, range from −30 to 105 deg F, and are of both fixed and variable differential types.



Offered in the 016 series are 11 models, including high pressure, low pressure, and temperature types. All are equipped with single pole double throw switches designed to open or close on rise of temperature or pressure. Manual reset is available. Fixed differential models will hold to 2 deg.

Three dual-pressure models in the 017 series have single pole single throw switches designed to close on rise of low-pressure side and open on rise of high-pressure side. Low-pressure differentials are adjustable between 4 and 40 psi; high-pressure differentials are fixed at 40, 50, or 60 psi.

More information? Circle Item 49 on postcard, page 125.

Blower Is Corrosion Resistant

A 40-inch. dia corrosion resistant PVC centrifugal blower, Model No. CB-40M, with a capacity of 15,000 cfm, is available from Industrial Plastic Fabricators, Inc., Norwood, Mass.

The new model like all other blowers in the company's line is especially applicable to installations used to expel corrosive air and fumes. Metal blowers, even when coated with expensive protectives have been found to involve costly maintenance and replacement. The firm's blower is constructed of unplasticized polyvinyl chloride; this is not a coating but a material with which the housing and impellers are constructed. It has been found that this material is extremely resistant to corrosion caused by the large majority of corrosive fumes and gases.

Impeller wheels are designed with back curve, non-overloading characteristics which maintain high efficiency for the conveyance of air and gases. Vibration is essentially eliminated and the impellers are not subject to unbalance. Blowers are equipped with a PVC shaft seal to give long service life to the main drive shaft. Inlet and outlet flanges, gaskets, and drain plug are standard PVC parts of the blowers.

More information? Circle Item 50 on postcard, page 125.

Smaller Electric Heaters

A line of smaller wall model electric home heaters is available from Westinghouse Electric Corp., Pittsburgh, Pa. They answer the need for smaller heating units under today's lower windows in homes, apartments, schools, and offices.

The nine flush-mounted home heating units, rated from 1000 to 6000 watts, operate on 240-volt a-c.

Height of the wall opening required to install heaters is reduced from 20¼ to 18¼ in. Width of the opening, reduced by ½ in., varies from 9½ to 27¾ in. The 3⅞-in. wall depth is unchanged.

Heaters normally heat by radiation and convection. Where convected heat alone is desired, an aluminum baffle blocks out infrared rays. A simple bi-metal thermostat automatically maintains the desired temperature in any room. Heating elements are guaranteed against burnout for 10 years. All models are finished in gray baked enamel with an aluminum grille.

Suggested list price ranges from about fifty dollars for the 1000-watt unit to one hundred dollars for the 6000-watt unit.

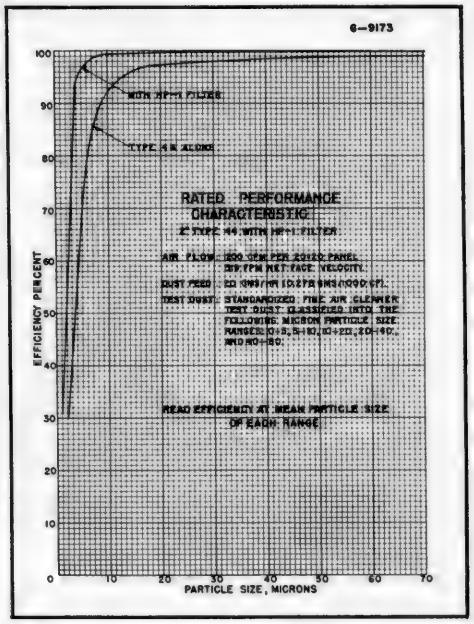
More information? Circle Item 51 on postcard, page 125.

You're Invited...
to see other new FAR-AIR products at Booth 506
ASHAE Exposition

Nearly 100% Efficient Air Filtration at Lowest Cost!

FAR-AIR TYPE HP
PAPER FILTER

Here is an inexpensive paper after-filter that, when used in conjunction with your present permanent filters, gives air cleaning efficiency that rivals that of the most expensive equipment . . . *at only a fraction of the cost!* Perfected after years of research, this flame-proof filter with its specially crimped media is ideal for situations where airborne dirt is critical yet budget is a factor. When used in combination with the Far-Air panel filter, dust particles as low as 2 microns in size are effectively removed. In addition to lowest first cost, the HP has a longer service life and can be replaced for pennies.



Type HP in place behind a standard FAR-AIR filter.

The HP is provided with a zinc plated wire retainer that clamps easily on most present filter holding frames. It is quickly installed without special tools. The special, flame-proof paper media gives trouble-free service.

So, where super air cleaning is a necessity, the FAR-AIR Type HP offers an excellent solution. Write for complete technical data.

FAR-AIR HP AT A GLANCE

- *Installs without tools or special equipment*
- *Zinc plated wire frame*
- *9 to 1 filtration area to face area*
- *20 sq. ft. filtering area*
- *High velocity, minimum pressure drop*
- *Size: 20" x 20" x 8"*
- *Low replacement cost*
- *Flame-proof*

FARR COMPANY
LOS ANGELES • NEW YORK • CHICAGO • NEW ORLEANS

Manufacturing Licensees:
Farr Company Mfg. Ltd.
Montreal, Canada
The Clyde Engineering Co. Pty. Ltd.
Sydney, Australia
Intermit Ltd.
Birmingham, England

Originators of **FAR-AIR** *Certified Filter Service*

NEWS OF THE MONTH

NEW I-B-R CODE

in the making for chilled water fan coil units. Committee of the industry formed.

A project is underway to develop a testing and rating code for chilled water fan coil units, the Institute of Boiler and Radiator Manufacturers announced.

I-B-R is sponsoring the project in cooperation with ARI and Mechanical Contractors Association of America.

• **TYPE OF UNIT DEFINED**—Type of unit to be codified is defined as "a forced circulation heat exchanger with an integral fan, which may be used for heating, cooling or dehumidification or any combination thereof. It does not include direct expansion coils."

Testing and rating procedures for these fan coil units will be patterned after the established I-B-R Codes for boilers, baseboards, and finned tube type of radiation.

• **COMMITTEE MEMBERS**—The committee responsible for developing the new code consists of: D. E. Morgan, Warren Webster & Company (chairman); B. C. Brown, National-U. S. Radiator Corporation; O. M. Maring, American Radiator & Standard Sanitary Corporation.

Assisting the committee are representatives from Acme Industries, Fedders-Quigan Corp., University of Illinois (Professor W. S. Harris), Mechanical Contractors Association of America, Modine Manufacturing Company, Worthington, and York Division of Borg-Warner.

Dollar-wise, 1956 was the largest in the history of residential air conditioning, topping one and a half billion dollars. Production of residential type heating-air conditioning thermostats at Minnesota plant of Minneapolis-Honeywell Regulator Company is shown, where production of these units was 121% over 1955, it reports. With installed prices as low as $600, or 25 cents per day pro-rated over a year, and the fact that equipment has now reached satisfactory standards of performance, the industry has attained its majority.

ARI RATING STANDARD

is proving successful as room cooler manufacturers publish capacity ratings of their units in Btus.

Air-Conditioning and Refrigeration Institute's program to provide prospective purchasers of room air-conditioners a true comparative capacity rating as a buying guide is working out even better than anticipated, it was announced this week by Geo. S. Jones, Jr., managing director of ARI.

• **TEN COMPLY FULLY**—Ten of the manufacturers who told ARI in September that they would test and rate their room air-conditioning units in compliance with the ARI Standard already have published specification sheets and other consumer literature giving capacity ratings in Btus, as prescribed by the standard. Six others have provided the Btu per hr ratings to ARI, for publication as the Institute sees fit, and four more have said that they will publish such ratings in future publications of specifications and consumer literature.

• **SOME STILL UNPUBLISHED**—Twenty-two manufacturers agreed in September to make public the ratings as arrived at under the ARI test procedure.

However, a number of these had their 1957 specifications and consumer literature in process of publication too early to make the tests required which would enable them to state the capacities of their products in Btus as provided under the ARI Standard. Among these are included the six manufacturers who have released capacity ratings of their various models to ARI but have not yet had an opportunity to publish them in printed form.

SCHOLARSHIPS

to eight high school boys annually will train technicians to relieve graduate engineers.

The critical engineering shortage in industry has prompted The Trane Co., La Crosse Wis., to adopt measures directed at helping alleviate a steadily worsening condition. The plan calls for a program of scholarships for young high school seniors who would not otherwise continue their schooling.

• **TO START IN FALL**—In cooperation with La Crosse State College, the company is sponsoring eight two-year pre-engineering $500 scholarships, $4,000 in total. The eight awards will be made yearly beginning with the fall term in 1957. Senior boys in eight nearby Wisconsin and Minnesota counties are eligible.

While the scope of the program is not great, the planning behind it is unusual and may hold part of the answer to the current engineering shortage dilemma, the company suggests.

(*Continued on page* 192)

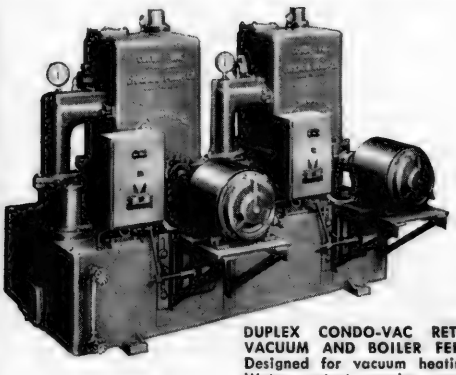
from "Chicago"

A SPECIFIC TYPE OF PUMP for every Steam Heating System

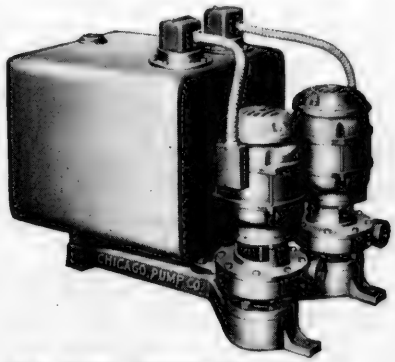
There's a Chicago Pump specifically designed for every type of building service steam heating system. No type of system has been overlooked by our engineers. *For any unusual condition; for below floor returns; for low vacuum systems; for small capacity, high pressure requirements; or for any standard system* . . . there is a Chicago Pump specifically designed 100% for the job. That means, there's no longer any reason for installing a pump that's not 100% suited to meet your needs. And you can be sure with a Chicago Pump that all ratings and receiver capacities meet or exceed standards of the American Society of Heating and Air Conditioning Engineers.

Write for details and free survey of your steam heating, pump requirements.

At left the TYPE AVC CONDENSATION PUMP & RECEIVER—Heavy cast iron receiver with low inlet for floor mounting or shallow pit. Cap. 500 to 10,000 EDR. Pressure 10-30 lbs.



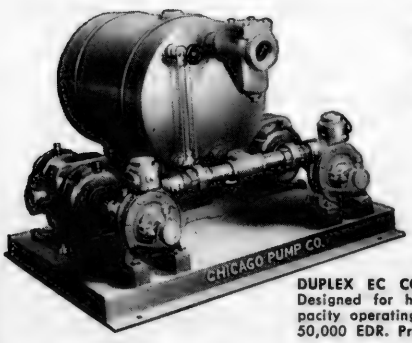
DUPLEX CONDO-VAC RETURN LINE VACUUM AND BOILER FEED PUMP—Designed for vacuum heating systems. Water content remains constant up to boiling point. Cap. 2500 to 150,000 EDR. Pressure to 40 lbs.



SURE RETURN CONDENSATION PUMP & RECEIVER — Condensate flows by gravity from receiver through base to pump. Available in single or duplex units. Cap. up to 75,000 EDR. Pressures, low or medium.

TYPE CLLI VERTICAL CONDENSATION PUMP & RECEIVER—Designed for low return service and underground installations. Cap. 1000 to 40,000 EDR. Pressures 10 to 25 lbs.

See us at the 13th International Heating & Air Conditioning Exposition Booth 30, International Amphitheatre, Chicago, Illinois, February 25 to March 1, 1957.



DUPLEX EC CONDENSATION UNIT — Designed for high pressure, small capacity operating conditions. Cap. up to 50,000 EDR. Pressures up to 150 lbs.

CHICAGO PUMP COMPANY
Subsidiary of Food Machinery and Chemical Corporation
BUILDING PUMP DIVISION
622 DIVERSEY PARKWAY • CHICAGO 14, ILLINOIS

Condo-Vac ®, Sure Return ®, AVC, LVC, Fire, House & Circulating Pumps, Pneumatic & Tankless Water Systems . . . Flush Kleen ® Sewage Ejectors, Little Giant ® & Non-Clog Bilge Pumps. Pumps for every Industrial use.

Located side by side, three major Flint, Michigan, department stores employ Binks cooling towers to help maintain store temperatures at 71°

3 cooling towers, 1 story... high performance-low maintenance

These 2-K and 3-B Series Binks cooling towers give good service with practically no maintenance, according to the service engineers for the stores.

What makes Binks cooling towers dependable performers?

High Efficiency. Binks patented Rotojet spray nozzles plus internal redwood decking assure a thorough water break-up. Scientifically balanced air-to-water ratio gives high cooling efficiency under all climatic conditions.

Minimum Maintenance. All parts are built to Binks rigid specifications. Panels and structural framework are heavily galvanized and coated. Blowers for 3-B towers are hot-dipped galvanized; 2-K Series fans are corrosion-resistant aluminum alloy. All parts are designed for easy erection and access—factors appreciated by those who assemble and maintain them.

Send for complete data

Write direct to the address below for Bulletins 477 and 333 describing 2-K or 3-B Series towers. Binks engineers will gladly study your needs and help you select the right tower from a complete line of mechanical and natural draft units.

Binks
EVERYTHING FOR WATER COOLING

A COMPLETE LINE OF NATURAL DRAFT AND MECHANICAL DRAFT COOLING TOWERS AND INDUSTRIAL SPRAY NOZZLES

Binks Manufacturing Company
3120-38 Carroll Ave., Chicago 12, Ill.

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

NEW CATALOGS

Use the prepaid postcard on page 125 for securing your copies of catalogs described in this department.

CONTROL TRANSFORMERS — Voltage ratings, frequency, frame size, weight, application, price, and specification data on autotransformers, control panel and machine-tool transformers are given in Bulletin GED-2767A, published by General Electric Co., Schenectady, N. Y. It contains accessory information, wiring diagrams, and voltage regulation curves for use in selecting the proper transformer for a given application. Special application section gives similar data on new line of refrigerator transformers as well as normal, high-reactance and encapsulated transformers for oil-well, mine, pumphouse, and other locations.

Circle **Item 52** on Inquiry Card

FORWARD CURVE FANS—Supplement 1 to Bulletin C-103 lists large capacity, slow speed forward curve centrifugal fans manufactured by Chicago Blower Corp., Franklin Park, Ill. Bulk of the 40-page catalog is devoted to detailed performance charts on the various fan types.

Circle **Item 53** on Inquiry Card

COMPRESSOR AND CONDENSING UNITS—A revised reciprocating compressor bulletin, DS-361, is available from The Trane Company, La Crosse, Wis. Included for the first time are ratings and data on the firm's 125 and 150-hp compressor and condensing units. Roughing-in dimensions have been changed for units with motors of 30 hp and smaller, due to a changeover the company will make to NEMA motor-frame sizes.

Circle **Item 54** on Inquiry Card

GAS PILOT FOR APPLIANCES—Bulletin GS 92, describing a gas pilot development called the Mini-Pilot 200 for space heaters, water heaters and other larger home appliances, is available from Grayson Controls Div., Robertshaw - Fulton Controls Co., Long Beach, Calif. Information concerning pilot's operation and installation and a detailed cutaway diagram showing the pilot assembly is included.

Circle **Item 55** on Inquiry Card

UNIT HEATERS—A vest-pocket edition of the Venturafin Unit Heater Handbook is now available from American Blower Corp., Detroit, Mich. The 64-page illustrated handbook (Bulletin 9417) contains specifications and operating characteristics as well as installation and application data for the complete unit heater line.

Circle **Item 56** on Inquiry Card

(*Continued on page* 180)

For 100% Control and Distribution of High Velocity Air...

AGITAIR® HIGH PRESSURE TERMINALS ...DISTINCTIVE AIR DIFFUSERS

AGITAIR High Pressure Terminals and noise attenuation boxes are the development of Air Devices Inc. engineers after years of research, laboratory and field work in the control and distribution of air through high velocity ducts.

These AGITAIR High Pressure Terminals combine all the practical operating features demanded by engineers to assure 100% control of high velocity air. AGITAIR High Pressure Terminals are available in a variety of types and styles.

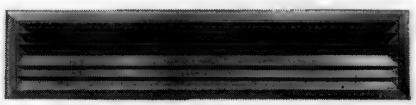
"RC"
PATTERNS UNLIMITED

CORRECT AIR DISTRIBUTION

To assure noiseless, draftless distribution of air from AGITAIR High Pressure Terminals, there is a complete line of AGITAIR distinctive diffusers that can be employed to meet any job requirement.

Separate catalogs are available containing informative, useful engineering data for each type AGITAIR diffuser —Type RC series (Square, Rectangular and Continuous)—Stripline (Slot Type) and Circular (Adjustable and Non-Adjustable.) Ask your AGITAIR representative for your copy of these catalogs or write direct to Air Devices Inc.

"RC" CONTINUOUS
(1 - 2 way blows)



STRIPLINE—SLOT TYPE
(1 - 2 way blows)

CIRCULAR
ADJUSTABLE & NON-ADJUSTABLE

Write for Catalog HP100

AIR DEVICES INC.

185 MADISON AVENUE, NEW YORK 16, N. Y.

AIR DIFFUSERS • FILTERS • EXHAUSTERS

INTRODUCING
Power Line
THE FINEST IN HEAVY-DUTY
INDUSTRIAL VENTILATING EQUIPMENT

Specializing In Complete Ventilating Systems for Custom Installation

Power Line will feature an extremely broad line of equipment *plus* specialized service to industry. . . . All sales will be made through highly trained ventilation engineers, fully qualified to design and layout complete plant systems. . . . Complete information on Power Line products and services will be gladly mailed on request.

SEE US IN BOOTH 744
13th INTERNATIONAL
HEATING & AIR CONDITIONING EXPOSITION
INTERNATIONAL AMPHITHEATRE, CHICAGO, ILL.
FEBRUARY 25 — MARCH 1
Selected Territories in Several Parts of the Country Are Available
TALK TO US AT THE SHOW

Power Line FAN COMPANY
PLAINFIELD, NEW JERSEY

NEW CATALOGS

(*Continued from page* 178)

Use the prepaid postcard on page 125 for securing your copies of catalogs described in this department.

PLASTIC AIR SYSTEMS—A comprehensive brochure on the subject of corrosion-proof ventilating and exhaust systems is published by American Agile Corp., Maple Heights, Ohio. It covers such items as thermoplastic corrosion-proof centrifugal fans, ducting and fittings, and hoods. Of particular interest is 6-page section devoted to a discussion of polyethylene and non-plasticized PVC centrifugal fans. This section presents detailed specifications on various models and attention is given to end functional figures and performances. Two pages detail various positions and arrangements to meet specific operating conditions. All data are arranged in chart form.

Circle **Item 57** on Inquiry Card

AMMONIA UNIT—Its Recold ammonia unit with hot gas defrost pan. for use in hot gas defrost systems, is described in Catalog 13C6a published by Refrigeration Engineering, Inc., Los Angeles, Calif. Included is a graphic illustration of the product with dimensions and specifications for ammonia direct expansion with defrost pan and ammonia flooded with defrost pan.

Circle **Item 58** on Inquiry Card

MOTOR MAINTENANCE — Two 20-minute, 35mm colored sound slide films which show maintenance people how to install and properly maintain electric motors are now available from Allis-Chalmers Mfg. Co., Milwaukee, Wis. The films, titled How to Make a Motor Go and Go, covering maintenance, and How to Take Step Seven, dealing with proper installation, depict by means of cartoon characters and illustrations how motors can be kept in good operating condition.

Circle **Item 59** on Inquiry Card

AIR BLENDER SYSTEM—Two booklets describing a heating and ventilating system for school-room application are offered by Sturtevant Div., Westinghouse Electric Corp., Hyde Park, Mass. Through photographs and text Booklets B-5195 and B-5915-A explain how the company's system works from a central supply source and how individual room control of heating, ventilation, and ventilation cooling is provided. Also discussed are custom cabinets with draft-stabilizer principle for use with modern school rooms having continuous type windows.

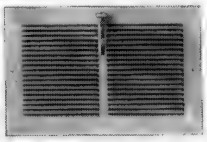
Circle **Item 60** on Inquiry Card

(*Continued on page* 182)

sure signs of indoor comfort!

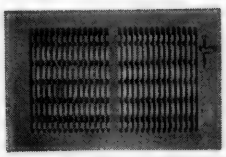
Standard Registers & Grilles

. . . for custom control of warm air heating



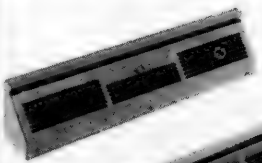
#41 H
WALL

SINGLE DAMPER FORCED AIR REGISTERS



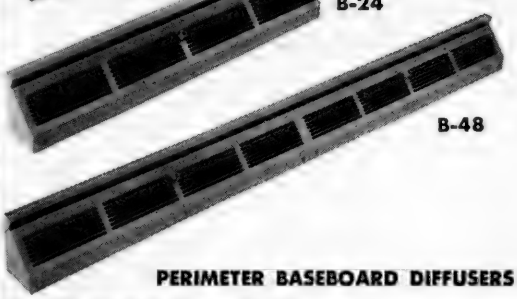
#331
WALL

MULTIPLE VALVE SIDEWALL & BASEBOARD REGISTERS



B-18

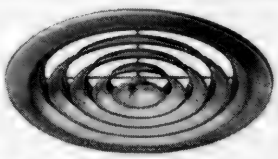
B-24



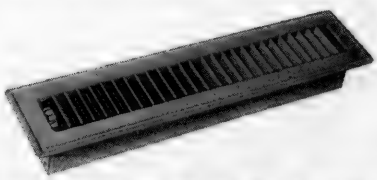
B-48

PERIMETER BASEBOARD DIFFUSERS

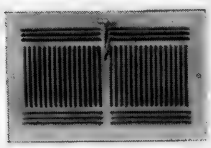
. . . for uniform, year-around heating and cooling comfort



CEILING AIR DIFFUSERS (flush and extended)

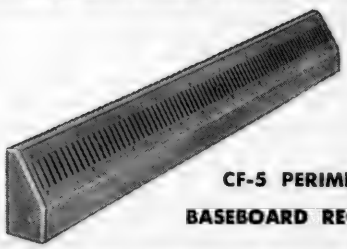


PH SERIES PERIMETER FLOOR REGISTERS



#551
WALL

PERIMETER BASEBOARD REGISTER NO. 551



CF-5 PERIMETER BASEBOARD REGISTERS

Also: return air grilles, baseboard and sidewall intakes, air cond. and ventilating returns, door grilles, floor registers, cold air faces, frames, ornamental metals.

Install Standard Registers and Grilles on every job to save time and increase customer satisfaction.

STANDARD STAMPING

. . . first in engineering for indoor comfort!

Mail the coupon today for new FREE catalog!

At Heating, Air-Conditioning Exposition see us at Booth 636, International Amphitheatre.

Standard Stamping & Perforating Co.
3139 W. 49th Place, Chicago 32, Illinois

Gentlemen: Please send me your new catalog showing the complete line of Standard Stamping Registers and Grilles.

Name_____

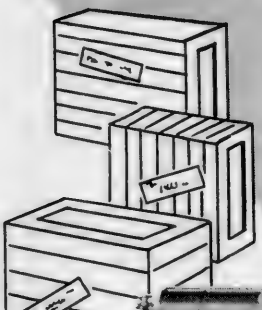
Company_____

Address_____

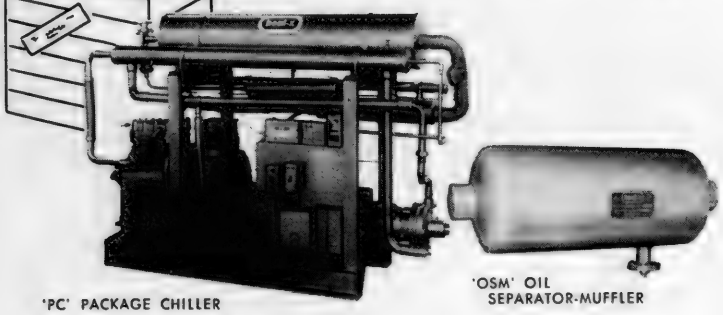
City_____ Zone____ State_____

"SEE YOU at the ASHAE SHOW"

Booths 910, 1244-48-50



There'll be many surprises for you in the Heat-X products on display at the Dunham-Bush booths 910, 1244-48-50 during the ASHAE Show in Chicago.

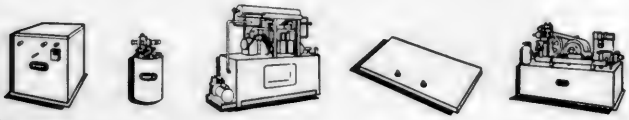


'PC' PACKAGE CHILLER

'OSM' OIL SEPARATOR-MUFFLER

You'll see many variations of Package Chillers for both residential and commercial use. The most advanced oil separator yet developed, the Heat-X 'OSM', will be on display . . . also Inner-Fin® Chillers and Condensers, Heat Interchangers and other products from the Heat-X **engineered line of heat transfer equipment.**

Be sure to see these new products of Heat-X, Inc., Dunham-Bush subsidiary, at booths 910, 1244-48-50.



HEAT-X, Inc.

BREWSTER • NEW YORK

NEW CATALOGS

(*Continued from page* 180)

Use the prepaid postcard on page 125 for securing your copies of catalogs described in this department.

ARC WELDING STANDARDS—Industry standards in arc welding studs, pins, and tapped pads for stud welding are concisely covered in a 36-page booklet, Form G-102, published by Stud Welding Div., KSM Products, Inc., Merchantville, N. J. Booklet contains complete index and reference to equipment and accessories used in stud welding applications. It details mechanical properties, chemistry, thread sizes, and plating and annealing information.

Circle **Item 61** on Inquiry Card

REFRIGERATION EQUIPMENT—A new condensed general catalog, No. R-400, is published by Kramer Trenton Co., Trenton, N. J. This catalog introduces a completely redesigned line of units for ceiling mounting in reach-in refrigerators, and, in addition, describes the company's line of heat exchangers, cooling towers, liquid receivers, and air conditioning units.

Circle **Item 62** on Inquiry Card

FURNACE LINE—Bulletins are available on its line of gas-fired and oil-fired forced air furnaces from Air Conditioning and Refrigeration Div., Worthington Corp., Ampere Station, N. J. Furnaces are illustrated. Diagrams show pertinent dimensions. Performance data are included. Bulletin numbers precede descriptions.

C-1100-S122, oil-fired upright furnace for basements or utility rooms, has 1000,000 Btu input.

Circle **Item 63** on Inquiry Card

C-1100-S124, gas-fired upright furnace, for basements or utility rooms, designed to accommodate addition of summer air conditioning, has 80,000 Btu input.

Circle **Item 64** on Inquiry Card

C-1100-S125, oil-fired upright furnace, for basements or utility rooms, recommended for builders in new home developments, has 80,000 Btu input.

Circle **Item 65** on Inquiry Card

C-1100-S130, gas-fired counterflow furnaces have 80,000 to 140,000 Btu output.

Circle **Item 66** on Inquiry Card

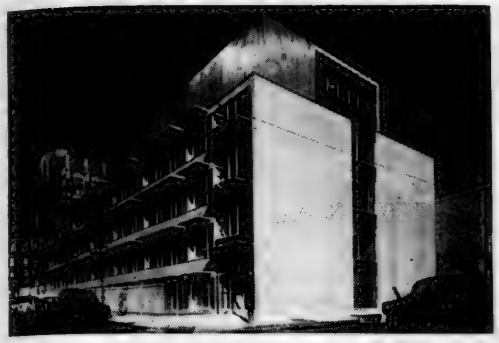
C-1100-S131, gas-fired highboy furnaces have 80,000 to 220,000 Btu input.

Circle **Item 67** on Inquiry Card

C-1100-S132A, gas-fired horizontal furnaces have 80,000 and 100,000 Btu input.

Circle **Item 68** on Inquiry Card

(*Continued on page* 184)



WEIL-McLAIN "HR" SERIES

HEAVY DUTY BOILERS SELECTED FOR ROOF-TOP INSTALLATION

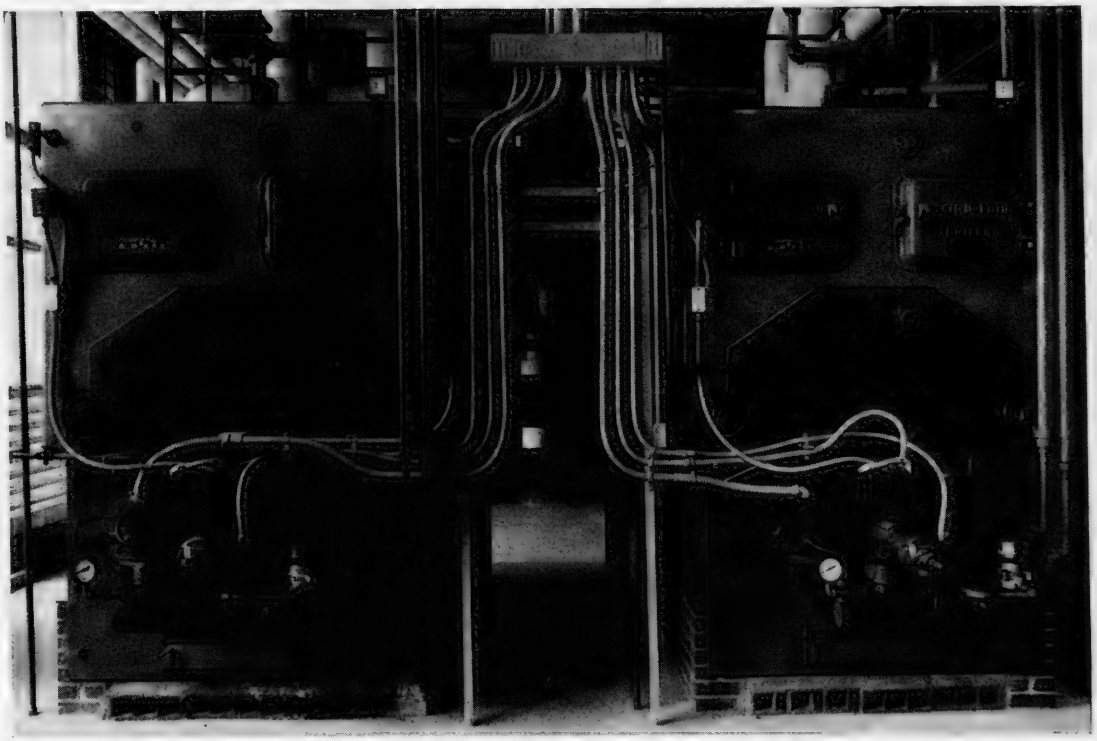
BUILDING
Temple University
Classroom Building
Philadelphia, Pa.

ARCHITECT
Nolen & Swinburne
Philadelphia, Pa.

MECHANICAL ENGINEER
A. Ernest D'Ambly
Philadelphia, Pa.

MECHANICAL CONTRACTOR
Williard, Inc.
Philadelphia, Pa.

DISTRIBUTOR
C. J. Rainear & Company, Inc.
Philadelphia, Pa.



These Weil-McLain HR-44 Boilers develop 130 H.P.

This pair of WEIL-McLAIN "HR" Series Boilers with rotary oil burners illustrates the trend to penthouse installation of the heating plant. Saving in space and elimination of costly chimneys are notable advantages.

The characteristics of WEIL-McLAIN Cast Iron Sectional Boilers are particularly valuable in this type of installation. The boiler is easier to erect because it can be moved to its site, section by section, at any time during building construction. Less head room and smaller floor area are required—no space needed for pulling tubes. Capacity can be increased at any time by merely adding sections.

In operating economy, the "HR" Series Boiler is completely outstanding. Designed in cooperation with leading makers of horizontal rotary oil burners, it fully develops the economies possible when burning low-cost, heavier oils.

Capacity Range
WEIL-McLAIN HEAVY DUTY BOILERS

OIL
35.3 to 113.3 H.P.

GAS
625,000 to 5,000,000 AGA input BTU/hr.

Send For Engineering Data

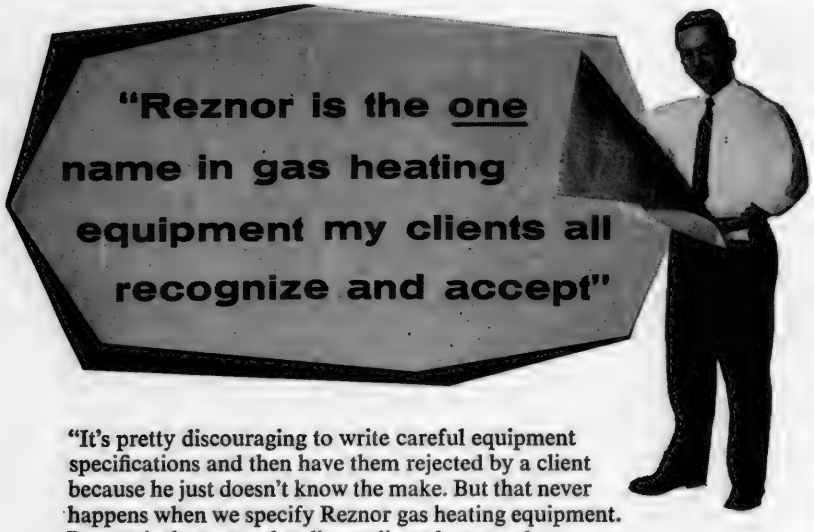
COMPARE THESE WEIL-McLAIN HEAVY DUTY BOILER FEATURES

1. Large fuel box volume develops better combustion conditions and maximum radiant heat transmission.
2. Curved primary heating surface greatly increases area directly above the fire.
3. Balanced flue gas travel distributes heat equally to all secondary surfaces.
4. Large waterways assure rapid, efficient water circulation.
5. Cast iron construction for long, trouble-free life.
6. Large steam space permits rapid generation of dry steam.
7. Individual short draw rods simplify assembly.
8. Special steel front plate and section simplify installation of rotary burner.
9. High base enlarges combustion space.

WEIL-McLAIN BOILERS · RADIATORS

WEIL-McLAIN COMPANY
MICHIGAN CITY, INDIANA

Address Literature requests to Dept. BB-27



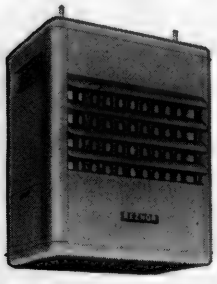
"It's pretty discouraging to write careful equipment specifications and then have them rejected by a client because he just doesn't know the make. But that never happens when we specify Reznor gas heating equipment. Reznor is the one make all our clients know and accept. It's not hard to understand why. Reznor sells nearly one out of two gas unit heaters, so Reznor is the unit heater our customers are used to seeing wherever they go. And Reznor is the brand they see advertised in the national magazines they read.

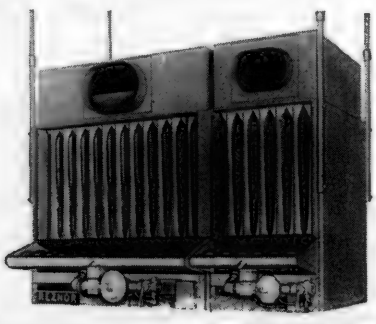
"Client acceptance is only one of the reasons we specify Reznor equipment. We know from experience that Reznor stands for quality of construction and performance. High operating efficiency . . . long life . . . dependable service.

"We like to work with Reznor because it gives us one source for all our gas heating equipment needs . . . suspended gas unit heaters for all industrial and commercial heating requirements . . . gas-fired duct furnaces which let us custom engineer heating and heating-cooling systems to meet exact job requirements.

"We appreciate Reznor availability, too. There's a stocking Reznor distributor in every major city. We know we can specify Reznor equipment with complete assurance that the units we specify will be available when and where they're needed."

Yes, Reznor is the preferred line of gas heating equipment . . . preferred by clients, by architects, engineers and heating contractors. If you don't know Reznor, it's time you got acquainted. Write today for free catalog or give your nearby Reznor distributor a call. You'll find him listed under "Heaters-Unit" in the yellow pages of your telephone directory.





REZNOR
THE WORLD'S LARGEST-SELLING GAS UNIT HEATERS
REZNOR MANUFACTURING COMPANY
64 Union Street, Mercer, Pa.

NEW CATALOGS

(*Continued from page* 182)

Use the prepaid postcard on page 125 for securing your copies of catalogs described in this department.

HUMIDIFICATION EQUIPMENT—Various types of industrial humidifiers, atomizers, air washers, Humiduct, and automatic controls are covered in Bulletin 104 published by The Bahnson Co., Winston-Salem, N. C. Its line of humidifiers illustrated include electric-powered models that are ceiling-hung, centrifugal humidifiers, and portable and gasoline-powered units.

Circle **Item 69** on Inquiry Card

INDUCED DRAFT DUCT FAN—A new catalog on the company's induced draft duct fan contains 20 pages of useful information and is offered by the DeBothezat Fans Div., American Machine and Metals, Inc., East Moline, Ill. This catalog gives for the first time all manufacturers' organizations boiler code ratings reduced to their common relationship of Btu per hr delivered to the steam. Also included are useful tables and charts on volume of flue gas for oil, gas and coal.

Circle **Item 70** on Inquiry Card

AIR DISCHARGE SIZING NOMOGRAM—A nomogram for finding outlet area for downward jet of heated air is now available from the Uni-Flo Air Distribution Div., Barber-Colman Co., Rockford, Ill. This nomogram is a simple method for determining the size of grilles and round openings necessary to project the heated air of a given temperature to the floor and greatly simplifies the engineer's work. Pencil marks made on the face of the nomogram during its use can easily be removed.

Circle **Item 71** on Inquiry Card

AXIAL FANS—An improved brochure, Bulletin AA-102, describing in detail its entire line of Axial Airfoil fans is announced by Chicago Blower Corp., Franklin Park, Ill. Pictures of each of 8 distinct fans with dimensional charts, performance tables, certified ratings and operational descriptions are included in the 20-page illustrated booklet.

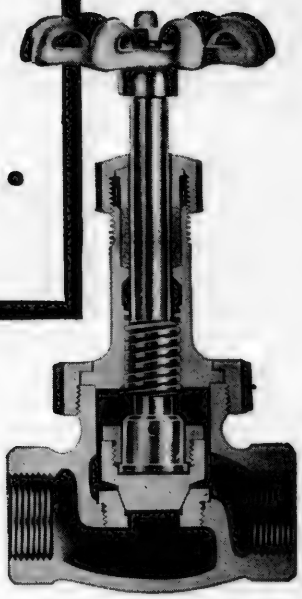
Circle **Item 72** on Inquiry Card

OUTDOOR THERMOSTAT CONTROL—Bulletin GEA-6530, describing its outdoor thermostat control system, is available from General Electric Co., Schenectady, N. Y. Components of the system are illustrated and described.

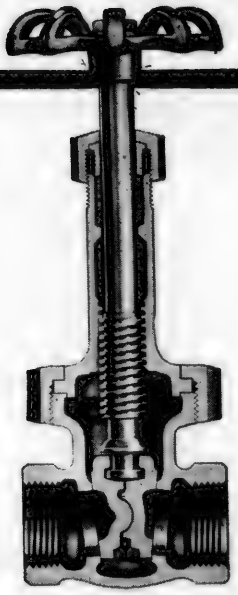
Circle **Item 73** on Inquiry Card

(*Continued on page* 186)

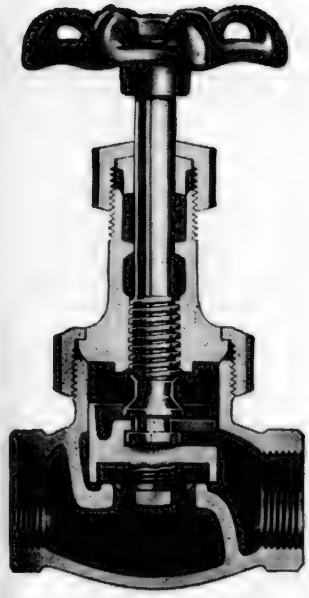
Walworth bronze valves...



Walworth No. 225P Globe Valve
500 Brinell Seat and Disc



Walworth
No. 29 Gate Valve



Walworth No. 95 Globe Valve
Re-New-Disc

built to give dependable trouble-free service on all recommended jobs

Walworth No. 95 Bronze Globe Valves (Angle Type: No. 96) are recommended for service where throttling is not required. They are rated at 150 psi working steam pressure, 500F; 300 psi cold water, oil or gas. The improved renewable disc and lock-on, slip-off disc holder — an original Walworth development—saves time and trouble. This valve can be repacked under pressure when fully opened. All parts are designed to give maximum service and strength.

Walworth No. 29 Bronze Gate Valves are rated at 200 psi working steam pressure, 550F; 400 psi cold water, oil and gas. These valves have rising stems and integral seats. Sizes 2-inch and smaller have union bonnets; sizes 2½ and 3-inch have bolted bonnets. Valves up to and including ¾-inch have solid wedge discs; 1-inch and larger have split wedge discs. These valves can be repacked under pressure when fully opened.

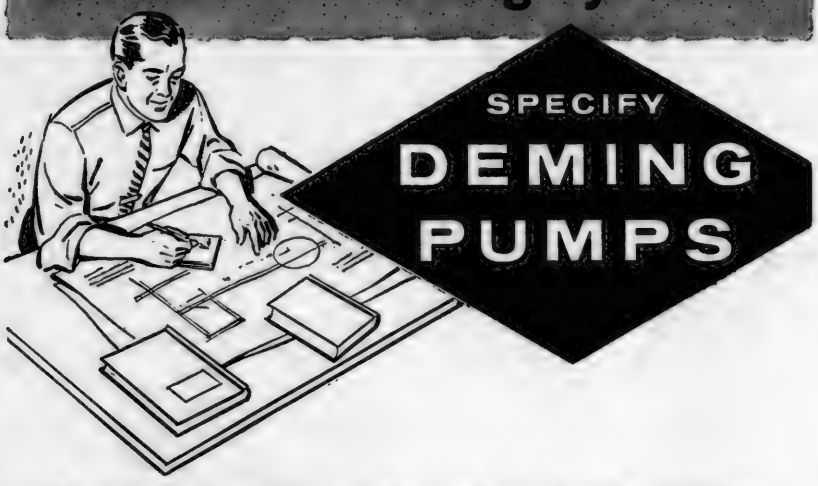
Walworth No. 225P Bronze Globe Valves (Angle Type: No. 227P) are rated at 350 psi working steam pressure, 550F; and 1000 psi non-shock service on cold water, oil and gas. The stainless steel, plug type seat and disc — heat treated to 500 Brinell — can be closed on sand, slag, scale and similar floatage, without injury to the seating surfaces. They are the longest wearing, TOUGHEST bronze valves you can buy.

For full information about Walworth Quality Bronze Valves, see your Walworth distributor, or write:

WALWORTH
valves and fittings

60 EAST 42nd STREET NEW YORK 17, N. Y.

EXPEDITE PUMP SELECTION for Air Conditioning Systems



These standard Deming Centrifugal Pumps have characteristics which contribute to efficient, economical air conditioning service. The three types of units illustrated cover a range of capacities from 5 through 1,000 G. P. M.

Fig. 4351 Series

Deming "MOTOR-MOUNT" Centrifugal Pumps, Figs. 4351 and 4357 are compact, dependable units. Available with ⅓ through 5 H.P. motors. Capacities from 5 through 140 G.P.M.

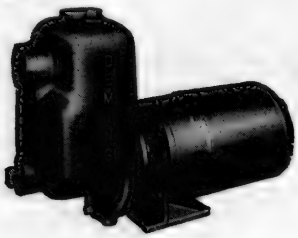


Fig. 3350 Series

Self-Priming type of "MOTOR-MOUNT" Centrifugal Pump. Priming is rapid, automatic, and foolproof. Non-siphoning feature. Capacities range to 140 G.P.M.

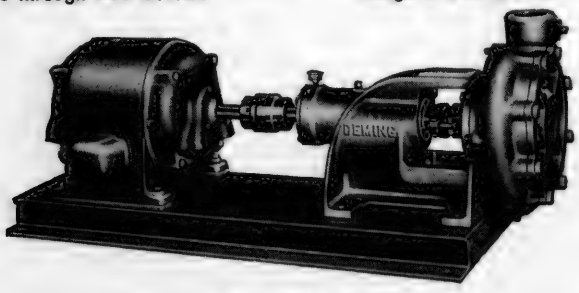


Fig. 4011 Series

These end suction centrifugal pumps are ideally suited for air conditioning service. 4-piece liquid end assembly permits easy service and maintenance. Two ball bearings supporting the shaft are mounted on heavy duty, streamlined support head. Many other top quality features. Capacities range to 1,000 G.P.M.

Send for Free Bulletins
Nos. 4355-C, 3300, 4011-B

THE DEMING COMPANY

558 Broadway, Salem, Ohio

NEW CATALOGS

(*Continued from page* 184)

Use the prepaid postcard on page 125 for securing your copies of catalogs described in this department.

APPALACHIAN COAL—A brochure on the organization and activities of Appalachian Coals, Inc., Cincinnati, Ohio, is available. History of the group, its membership, the long-range market, planned salesmanship, and applied engineering are discussed.

Circle **Item 74** on Inquiry Card

HEATING EQUIPMENT — A heating equipment price book billed, No. 113, as the most complete in the fluid heating industry has just been issued by Crane Co., Chicago, Ill. It carries prices on everything from boiler to baseboard in its 119 pages, which begins with an easy-to-read index, and includes two pages on boiler rating and selection data. Other high spots include packaged boilers available, steel baseboard accessories to compliment the company's radiant baseboard, and new conversion oil burners.

Circle **Item 75** on Inquiry Card

VOLUME CONTROL DAMPER—Its No. 6 TFD volume control damper, a simplified, adjustable damper for use with its Aerofuse ceiling diffusers, is illustrated in Bulletin 112 published by Tuttle & Bailey, Div. of Allied Thermal Corp., New Britain, Conn. Sizes, list prices, assembly instructions, and installation details are covered. A list of branch offices and representatives is included.

Circle **Item 76** on Inquiry Card

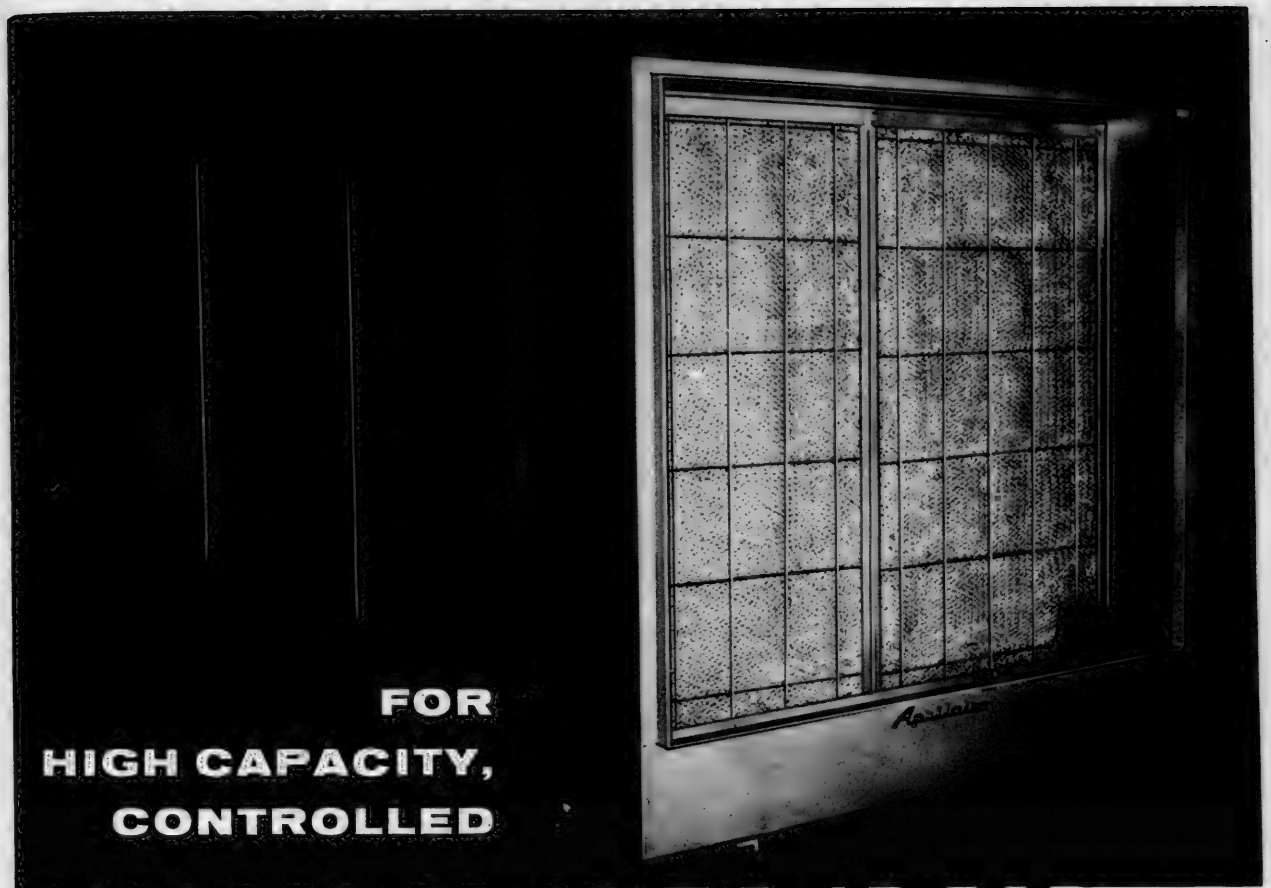
COOLING CONTROLS — A condensed catalog on refrigeration and air conditioning controls, Bulletin 1487-AE, has been prepared by Penn Controls, Inc., Goshin, Ind. The 24-page catalog includes a complete listing of the company's standard cooling controls for pressure and temperature applications in standard, heavy duty and extra heavy duty constructions; oil protection controls; water regulating valves; defrost controls; cooling tower controls; solenoid valves; humidistats; and cooling and heating-cooling thermostats.

Circle **Item 77** on Inquiry Card

ALUMINIZED STEEL — Properties and characteristics of aluminized steel Type 1 are covered in Bulletin P. O. 3056 published by Armco Steel Corp., Middletown, Ohio. Steel's resistance to combinations of heat and corrosion, high heat reflectivity, and surface qualities of aluminum with strength of steel are discussed.

Circle **Item 78** on Inquiry Card

(*Continued on page* 188)



FOR
HIGH CAPACITY,
CONTROLLED

HUMIDIFICATION

RP **Aprilaire**

AUTOMATIC-ELECTRIC HUMIDIFIERS

HIGH CAPACITY

Aprilaire Industrial Humidifiers (illustrated) are designed to provide capacity for practically any size requirements. Unit sizes up to 10 G.P.H.—can be installed singly or in a series of any number of units.

POSITIVE CONTROL

The Aprilaire introduces relative humidity as needed ...and only when needed. Automatic control eliminates possibility of lag or over-run.

FLEXIBILITY

Aprilaire industrial models are available for gas, steam or hot water heat source. Every model can be pedestal-mounted or suspended—according to individual requirements.

BACTERIA REMOVAL

The Aprilaire's entirely new principle of humidification, introducing humidity as a water vapor, provides an important plus feature—the removal of up to 70% of all bacteria in the air stream circulating through the unit.

ISOTHERMAL OPERATION

The Industrial Aprilaire has no temperature effect on the humidified air. Exhausted, humidified air is discharged at the same temperature it enters the unit.

MINIMUM MAINTENANCE

Because the only liming or water solids deposits occur on the inexpensive, replaceable evaporating pads... mechanical difficulties from these usually troublesome deposits are eliminated.

INDUSTRIAL AND RESIDENTIAL MODELS AVAILABLE-WRITE FOR COMPLETE INFORMATION

see our catalog in S PLANT ENGINEERING FILE or write for copy

RP ... PRODUCTS OF RESEARCH

RESEARCH PRODUCTS Corporation

Dept. 913, Madison 10, Wisconsin

Cross section shows structural superiority of Aeromaster's new, extruded aluminum-alloy blades in diameters from 9′ to 22′.

NEW! EXTRUDED ALUMINUM Blades on AEROMASTER* fans only

AEROMASTER'S new, extruded aluminum blades combine in one design the advantages of a light weight metal, a hollow structure and the superior strength of wrought metal... Silicon-magnesium aluminum alloys resist corrosion. Their fine grain structure, high tensile strength and increased endurance limit eliminate danger from wear, vibration, and metal fatigue . . . true airfoil blade sections assure maximum air delivery . . . adjustable blade pitch angle permits decrease of fan load to an accurate minimum horse-power requirement.

The AEROMASTER fan is easily assembled *in the tower.* No special handling equipment is necessary. AEROMASTER fans cost less to install, less to operate, less to maintain!

For more details write to KOPPERS COMPANY, INC., Aeromaster Fan Dept., 6902 Scott Street, Baltimore 3, Maryland.

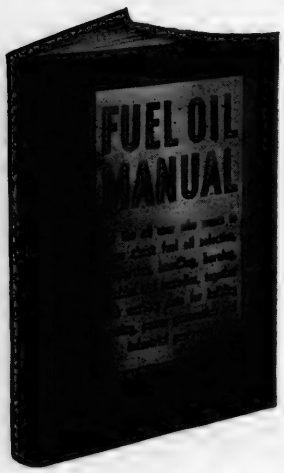
KOPPERS

Aeromaster Fans

Engineered Products Sold with *Service*

*Koppers Trademark

Get This Valuable Information on Fuel Oil Characteristics and Uses



160 Pages 34 Tables

$3.50

In Canada or overseas, $4.20

Here is a book that will give you a comprehensive picture of the characteristics and uses of every type and grade of fuel oil. The author explains the meaning of each oil property, and shows how this information is applied to the selection, handling and burning of fuel oil. Impurities and how they affect combustion are described fully, and a special chapter describes fuel oil additives and how they are used. Another chapter lists troubles which may be encountered in using fuel oils, and shows the correct remedy to apply in each case. Technical language is avoided wherever possible, and all terms are fully explained.

THE INDUSTRIAL PRESS, 93 Worth Street, New York 13, N. Y.

NEW CATALOGS

(*Continued from page* 186)

Use the prepaid postcard on page 125 for securing your copies of catalogs described in this department.

OIL BURNERS — Specification Bulletin 123-R56, lists the line of oil burners manufactured by The Carlin Co., Wethersfield, Conn. For quick reference and comparison, all ten standard models are illustrated and described on three facing pages which form the center section of the bulletin. In addition to capacities and specifications, dimensions and shipping weights are given.

Circle **Item 79** on Inquiry Card

ELECTRIC CONTROLS—Bulletin J-100 covers electrical remote positioning controls for both pushbutton and automatic operation manufactured by The Jordan Co., Inc., Milwaukee, Wis. Its 8 pages cover a shaft-mounted control gearmotor for valves and variable-speed drives, a sequencing controller, proportional valve operator, blending control, and automatic tension and velocity control.

Circle **Item 80** on Inquiry Card

FLEXIBLE COUPLINGS—Its principle, employing preloaded rubber biscuits as the flexible medium in its couplings, is explained and illustrated in 24-page Bulletin C 41-56 published by Morse Chain Co., Ithaca, N. Y. Dimensions and specifications are given on standard, double, and radial type couplings with additional data on coupling driveshafts.

Circle **Item 81** on Inquiry Card

CEILING AIR DIFFUSERS— The Multi-Vent Division of the Pyle-National Co., Chicago, Ill., announces a new 8-page bulletin, No. 390-F-57, describing their full line of low-velocity, ceiling air diffusers. This bulletin gives engineering data and diffuser selection data on a combination ceiling air diffuser and fluorescent troffer light, as well as the data on standard diffusers for flush mounting in every type of ceiling.

Circle **Item 82** on Inquiry Card

NUCLEAR REACTORS — Bulletins describing the aqueous homogenous burner reactor and a tank-type research reactor have been issued by Foster Wheeler Corp., New York, N. Y. Bulletin N-56-8 describes the operation of the aqueous homogeneous power plant, its auxiliary system, biological shield and containment, and includes a cross-section and flow diagram. The operation and wide range of research facilities of the tank-type reactor are described and illustrated in Bulletin N-56-9.

Circle **Item 83** on Inquiry Card

(*Concluded on page* 190)

The motors with the built-in "hush"

Louis Allis designed them specifically for quiet operation

When you place an air-conditioning unit in close proximity to people, you must avoid disturbing noise characteristics.

In hospitals, nerve-racking resonance is therapeutically harmful. Even in less demanding installations like hotels and office buildings, silence is a prime specification for those concerned with guest comfort or increased worker efficiency.

Louis Allis motors are specifically designed for silent, vibrationless operation. Housings, bearings, end brackets are all thoroughly tested for *quietness*.

Result? A built-in "hush", particularly welcome in commercial installations.

Find out more about L. A. motors. Contact your nearby Louis Allis District Office, or write for our file-size Reference Bulletin 1700, "The New L. A. Line of Electric Motors." The Louis Allis Company, 454 East Stewart Street, Milwaukee 1, Wisconsin.

LOUIS ALLIS

LA-112

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE-SPEED DRIVES

LOOK AT THIS **NEW**
FORCED-DRAFT BURNER
THAT DELIVERS **BIG**
PERFORMANCE

UL LISTED

OIL
syncro
flame
OIL

FOR COMMERCIAL AND INDUSTRIAL INSTALLATIONS

While this burner *looks* like a standard residential type, it is a *big* heavy-duty machine. Features include two-stage fire, built-in controls for pre-purge, post-purge, and high-low-off fire control with automatic air/fuel ratio settings, terminal strips for accessory wiring, and wide ranges of capacities.

FOR 20 TO 150 H.P. BOILERS HIGH STACK NOT REQUIRED

SYNCRO/FLAME Pressure Burners are capable of firing efficiently into combustion chamber pressures of 3" of water or more, eliminating the need for high stacks or expensive forced draft equipment. *No ordinary burner can do this!* SYNCRO/FLAME Pressure Burners are available for oil, gas, or dual-fuel service.

DETAILS ON REQUEST
Write today for data sheets describing all features and giving full specifications.

MANUFACTURERS OF OIL AND GAS AND OIL/GAS BURNERS
SYNCHRONOUS FLAME, INC.
WALWORTH • WISCONSIN

NEW CATALOGS

(*Concluded from page* 188)

Use the prepaid postcard on page 125 for securing your copies of catalogs described in this department.

CABINET HUMIDIFIERS—Units utilizing vinyl plastic sheets, rolled out from the center like a jelly roll, forming a revolving drum to give large wetted surface for humidification of air, are described in a 4-page brochure by its manufacturer, Swan Humidifier Co., Inc., Ballston Spa, N. Y. Six models, ranging in capacity from 8 to 35 gal of water evaporated per 24 hr, in cabinet models, portable and automatic, and in automatic units for connection to heating plant, are discussed.

Circle **Item 84** on Inquiry Card

PACKAGED FIRE-TUBE BOILERS—Bulletin ID-56-215 describing its YFB line of packaged fire-tube boiler-burner units engineered for 4-pass fire travel and automatic operation with oil or gas or oil-gas combinations is available from York-Shipley, Inc., York, Pa. Specification table is included in the 8-page brochure.

Circle **Item 85** on Inquiry Card

INDUSTRIAL COOLING LINE—Its temperature control equipment line is described in a pamphlet published by Vic Mfg. Co., Minneapolis, Minn. Items covered are: air-cooled refrigerated water chiller, air-cooled refrigerated liquid chiller, a heat exchanger, a water temperature regulating valve, and an automatic heating control. A dissertation is included on the merits of small air-operated units and other cooling methods.

Circle **Item 86** on Inquiry Card

GAS VENT GUIDE—Tested gas vent installation data, with diagrams, sketches, and tables, are contained in a comprehensive 16-page guide published by William Wallace Co., Belmont, Calif. Of primary importance are 8 tables covering the company's double-wall gas vent pipe sizes from 3-in. through 12-in. interior diameters. From these tables the correct and safe gas vent installation can be determined for any type of approved gas appliance that may be vented with Type B gas vents. Tables are based on the Kinkead equations of vent operation, to which the exact heat loss factor was added by the Stanford Research Inst.

Circle **Item 87** on Inquiry Card

MALLEABLE IRON FITTINGS—A 4-page brochure published by Detroit Brass & Malleable Co., Wyandotte, Mich., lists its line of malleable iron fittings, now boxed in space-saving cartons. Elbows, tees, caps, plugs, floor flanges, unions, reducers, and hex bushings are covered.

Circle **Item 88** on Inquiry Card

INDUSTRIAL EDUCATION — The key role of the skilled craftsman as the anchor man on industry's technological team is stressed in a new educational aid booklet published by the Education Department of the National Association of Manufacturers, New York, N. Y. The pocket-sized 32-page booklet, Your Opportunities in Industry as a Skilled Craftsman, covers the scope, content and importance of apprentice training and cites the immediate values of vocational-industrial and industrial arts training in helping a youngster get a head start on skill development.

Circle **Item 89** on Inquiry Card

WATER ADSORPTION AGENT — How an activated carbon impregnated with an inorganic desiccating agent develops a high capacity for adsorption of water is explained in a new bulletin issued by the Barnebey-Cheney Co., Columbus, Ohio. The bulletin on Adsorbite D-8, manufactured by the carbon specialtists, explains the various uses for the highly-effective dehydrating agent and shows that a single system based on the product can dehumidify, cool, and deodorize the air.

Circle **Item 90** on Inquiry Card

COMBUSTION ANALYZER — A new four-page product specification, E65-5, available from Bailey Meter Co., Cleveland, Ohio, describes the Heat Prover combustion analyzer which indicates per cent by volume oxygen and combustibles present in the exhaust gases from all types of boiler and industrial furnaces. Operating and physical characteristics are provided, together with a list of accessories and ordering information.

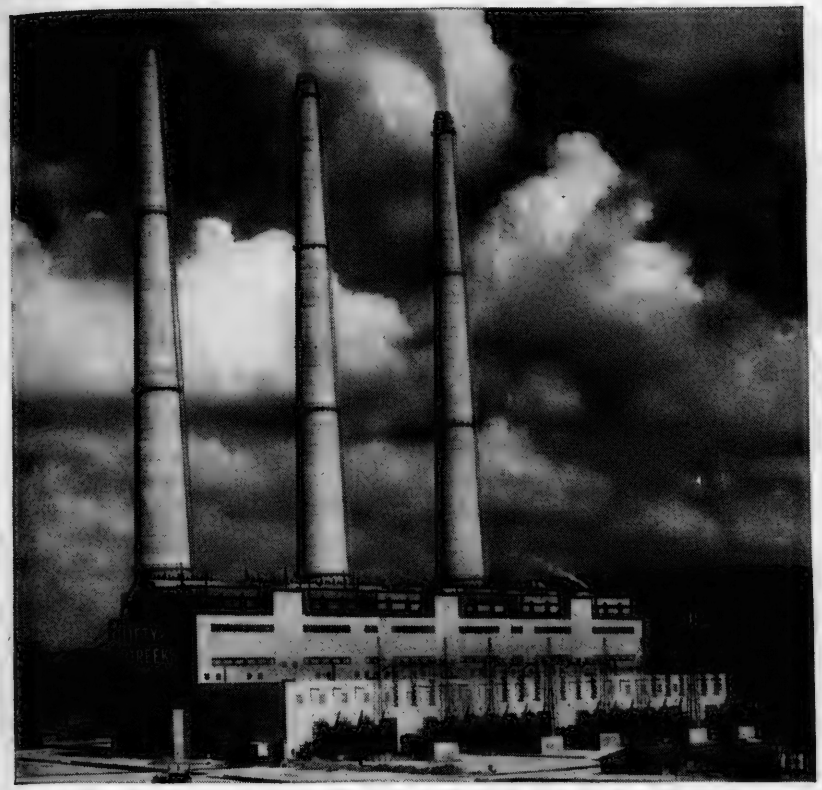
Circle **Item 91** on Inquiry Card

PLUMBING AND HEATING VALVES—A condensed catalog of the complete line of plumbing and heating valves for domestic, commercial, and industrial use is published by Hammond Brass Works, Hammond, Ind. Special emphasis is given to the company's expanding line of heavy duty globe, gate, and check valves, which are produced to and comply with rigid federal specifications. Also included is the line of radiator and circulator valves and fittings, for steam, gravity, and forced hot water heating systems.

Circle **Item 92** on Inquiry Card

AIR CONDITIONING UNITS—A four page bulletin, GAC-26, describing five of the manufacturer's air conditioning units, is published by General Air Conditioning Corp., Los Angeles, Calif. Typical installations in homes, offices, and commercial establishments are portrayed and complete specifications are given. All models are available with a heat pump.

Circle **Item 93** on Inquiry Card



GIANT ON THE OHIO. Clifty Creek Plant at Madison, Ind., is the world's largest investor-owned power plant—with a 1,290,000 kilowatt capacity. The complex air conditioning requirements for this "big job" were met efficiently by General Electric Zone-by-Zone method.

General Electric
ZONE-BY-ZONE
Air Conditioning chosen for largest power plant ever built by industry

When air conditioning was selected for the giant Clifty Creek power plant, the engineers chose General Electric Zone-by-Zone method. Not only was this system most economical to install—but its flexibility permits a continuing economy in cooling costs.

General Electric Air Conditioning can be installed step-by-step, if desired, so that the investment at any time can be kept relatively low. Space presents no problem—ceiling-mounted units take no floor space and floor-mounted units may be stationed out of space. These smartly streamlined units are self-contained, trouble-free. And you'll always go right specifying General Electric products.

You owe it to your clients to consider General Electric Zone-by-Zone Air Conditioning in economically planning their requirements. General Electric Company, Commercial and Industrial Air Conditioning, 5 Lawrence Street, Bloomfield, N. J.

Progress Is Our Most Important Product

GENERAL ELECTRIC

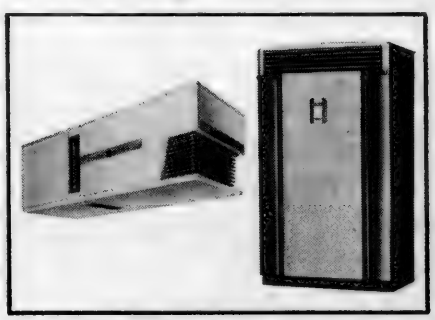
EACH ZONE INDIVIDUALLY COOLED BECAUSE EACH UNIT INDIVIDUALLY CONTROLLED

You air condition only the areas you need when you need it.

CONTROL ROOM at base of each of three stacks—tallest in the world—adequately air conditioned by 2 General Electric 10 ton Units. Third unit (located out of space) serves foreman's offices. Each of the 3 control rooms is air conditioned by General Electric Units in a similar manner.

CAFETERIA receives its cooling from a 10 ton and a 7½ ton unit. When area served is not in use, Zone-by-Zone Air Conditioners may be turned off without affecting other areas.

LOCKER ROOMS air conditioned by a 3 ton unit. In addition, all offices and laboratory have General Electric Zone-by-Zone Air Conditioning.



CEILING-MOUNTED UNITS *take no floor space*—available in 3, 5 and 7½ ton capacities, water-cooled; 3 and 5 ton air-cooled; **FLOOR-MOUNTED UNITS** in 3, 5, 7½, 10 and 15 ton capacities.

New design Refrigerant Condenser

...gives far more efficiency and better, trouble-free service

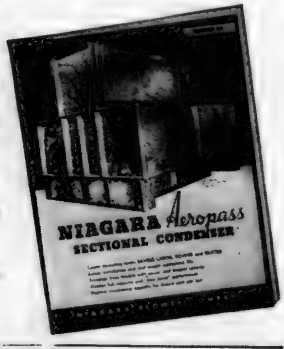
With this new, sectional design Niagara condenser you avoid the many troubles due to faulty condensing and get at all times the full capacity your refrigerating plant should afford.

You benefit from extra saving in upkeep labor and expense. The casing of this new condenser is made of sections each separately removable, giving you access to all parts for easy inspection to head off dirt and corrosion, to clean the coils easily from either side.

You benefit from greater efficiency in condensing. A simpler method of using evaporative cooling improves heat transfer. You benefit from Niagara features that remove super-heat before condensing and keep the system purged of oil. You save 95% of the cooling water cost.

You benefit from a low first cost, lower freight cost and less expense in erection.

Capacity range is from 60 to 240 tons. Write for Niagara Bulletin 131. Find out how your plant can save expense this season.



NIAGARA BLOWER COMPANY

Dept. H. V., 405 Lexington Avenue
NEW YORK 17, N. Y.

District Engineers in Principal Cities

NIAGARA — *Over 40 Years' Service in Industrial Air Engineering*

Purpose of the program is to interest young men to train as engineering technicians by completing a strong, two-year curriculum, stressing mathematics and science. The curriculum includes established courses at La Crosse State College and two University of Wisconsin Extension Division classes.

• **WILL JOIN FIRM**—After the two year period, the scholarship recipients will join the company, relieving graduate engineers of many of their more time-consuming responsibilities. In this way, the engineers will be able to devote greater percentages of their time to more pressing problems.

As a result there will be better use of the skills of present engineers. Graduate engineers will be free to concentrate on problems taxing their full abilities while the new group of pre-engineering trained technicians would take over those other duties, still important, but not requiring the specialized skills of fully trained engineers. At Trane, where one in every four office employees is a graduate engineer, they expect the program to have far reaching results.

• **SUMMER EMPLOYMENT**—As added incentive, the company plans to arrange summer employment in its engineering department while the students are participating in the program. After completing the two-year course, the students will be able to join the firm as engineering technicians. Should they decide to go on with their schooling to seek engineering degrees, they will be free to do so and will receive credits towards the degrees from courses completed.

• **COMMITTEE SELECTS**—Eligibility is limited to the top quarter of senior boys in the high schools participating. Two years of high school mathematics and one science are preferred. In all cases, the scholarship winners must be in need of financial aid. Applicants will be selected by a three-member scholarship committee, including one company representative and two from La Crosse State College. Final selection will be based on aptitude test scores, scholastic record, and interview results.

As in most scholarship programs, the $125 semester award will continue for four semesters contingent on maintenance of satisfactory grade levels. The new scholarship program is in addition to the company's established scholarship and fellowship grants to over a dozen educational institutions yearly.

MEETING PLANS

announced for St. Louis convention, American Industrial Hygiene Assn.

Plans have been completed for the eighteenth annual conference of the American Industrial Hygiene Association to be held in St. Louis, Mo., April 23 to 26, at the Sheraton-Jefferson Hotel. Technical sessions will be held at Kiel Auditorium. Chairman of the program committee, Dr. C. R. Williams, announces that an outstanding program has been arranged encompassing all phases of industrial hygiene.

(*Continued on page* 194)

Carrier *Weathermaker Air-Conditioning Units*

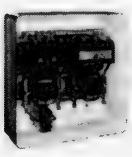
operated by **ALLEN-BRADLEY TROUBLE FREE MOTOR CONTROLS**

A-B Quality

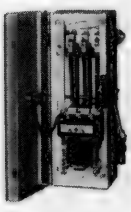
The Sign of Quality Motor Control

Carrier Weathermaker No. 38C air conditioner for residential use

Typical Allen-Bradley Quality Motor Controls



Bulletin 736 Part Winding Motor Starter



Bulletin 640 Manual Resistance Type Starter

Bulletin 746 Automatic Auto-transformer Type Starter

To obtain reliable service year after year, from an air-conditioning or refrigeration unit, it must be equipped with a starter built to "take it". . . and over the last 25 years Allen-Bradley Bulletin 709 solenoid starters have established their reputation for dependable operation.

This performance is due to the simplest starter mechanism yet conceived . . . the solenoid switch with only ONE moving part. No pins, pivots, or bearings to corrode and bind . . . no jumpers to break. The cadmium silver alloy contacts never require troublesome cleaning, filing, or dressing.

In addition, Allen-Bradley Quality Motor Controls have these "plus" values . . . overload relays that retain their accuracy irrespective of time or operating conditions . . . highly efficient magnetic circuits that hold through wide voltage fluctuations . . . white interiors that make for easier wiring in dark locations. Specify Allen-Bradley . . . for millions of trouble free operations.

Complete information on Allen-Bradley Quality controls is contained in the A-B Handy Catalog . . . an abbreviated encyclopedia on motor control. Write for your copy, today.

Allen-Bradley Co.
1330 S. Second St., Milwaukee 4, Wis.
In Canada
Allen-Bradley Canada Ltd., Galt, Ont.

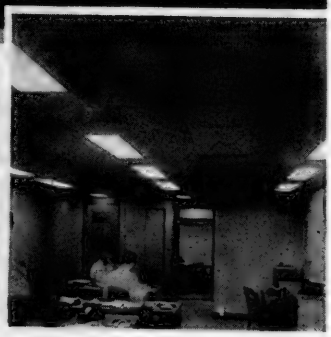
ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
Quality

NEW ECONOMY IN RADIANT HEATING...

...is now possible with the completely integrated SIMPLEX radiant-acoustical ceiling.

One trade rapidly installs this *one* completely integrated ceiling which includes all radiant ductwork, aluminum acoustical panels, diffuser panels and framing for recessed fixtures. *One* medium, air, is responsible for heating, cooling, ventilation and humidity control.

The result is a system which combines the speed of response and installation economy of forced air systems with the superior comfort of radiant heating and cooling—at prices which have competed successfully with quality conventional forced air systems of heating and air conditioning.



(Above) Some 30,000 sq. ft. of SIMPLEX radiant-acoustical ceiling help keep patients in the new Beckley Memorial Hospital, Beckley, W. Va., comfortable. Archt: Isadore Rosenfield, Engr: John D. Dillon, both of N. Y.

(Right) Attractive anodized aluminum ceiling surface is free of conventional air diffusers and dirt rings. Station Master's Office in Grand Central Station, N. Y.

Send today for AIA booklet containing photographs, details and specifications.

SIMPLEX CEILING CORP.

552 W. 52 St., New York 19, New York

Please send me folder 39b describing your radiant-acoustical ceiling.

Name .....

Firm .....

Address .....

City ..... Zone..... State.....

Co-chairmen of the conference committee are Elmer Wheeler, Monsanto Chemical Company, St. Louis and Louis Garber, Missouri Division of Health, Jefferson City.

• **ARRANGERS**—Session arrangers are: *Air Pollution*—William B. Harris, U. S. Atomic Energy Commission, New York City; *Toxicology*—Dr. Joseph F. Treon, Kettering Laboratory, University of Cincinnati School of Medicine; *Radiation*—J. J. Fitzgerald, Knolls Laboratory, General Electric Co., Schenectady, N. Y.; *Engineering*—William S. Johnson, Medical Division of Bethlehem Steel Co., Bethlehem, Pa.; *Chemical and Analytical*—James F. Morgan, Medical Department of the Pennsylvania Railroad, Philadelphia, Pa.; *Noise*—Dr. Paul Michael, John T. Ryan Medical Laboratory, Pittsburgh, Pa.

• **BANQUET**—The Cummings Memorial Lecture for 1957 will be given by Dr. H. H. Schrenk, who is recognized for his outstanding work in the field of industrial hygiene and toxicology during his work with the U. S. Bureau of Mines, the U. S. Public Health Service, and presently as Research Director, Industrial Hygiene Foundation.

• **TECHNICAL SESSIONS**—In addition to a joint session with the American Conference of Governmental Hygienists on Tuesday afternoon, and general sessions Wednesday forenoon and afternoon, concurrent technical sessions will be conducted at Kiel Auditorium all day Thursday and Friday forenoon. These sessions will deal specifically with air pollution, chemical and analytical, engineering, noise, radiation, and toxicology.

GREATER ANTHRACITE USE

predicted for 1957, following sizable growth in 1956, based on quickened sales of automatic equipment.

A two and a quarter million-ton increase in anthracite production for the calendar year of 1956 will be followed by further substantial gains in 1957, according to a consensus of industry leaders, Anthracite Information Bureau, New York, N. Y., reports.

Optimism is based not only on the expanding sales of anthracite for home and commercial heating and export requirements for hard coal, but also on consistent increases over the past two years in the sale of automatic anthracite burning equipment.

• **EXPORTS UP**—Exports increased steadily month-by-month through the year and currently are running at a rate more than three times the 1955 total of 700,000 tons.

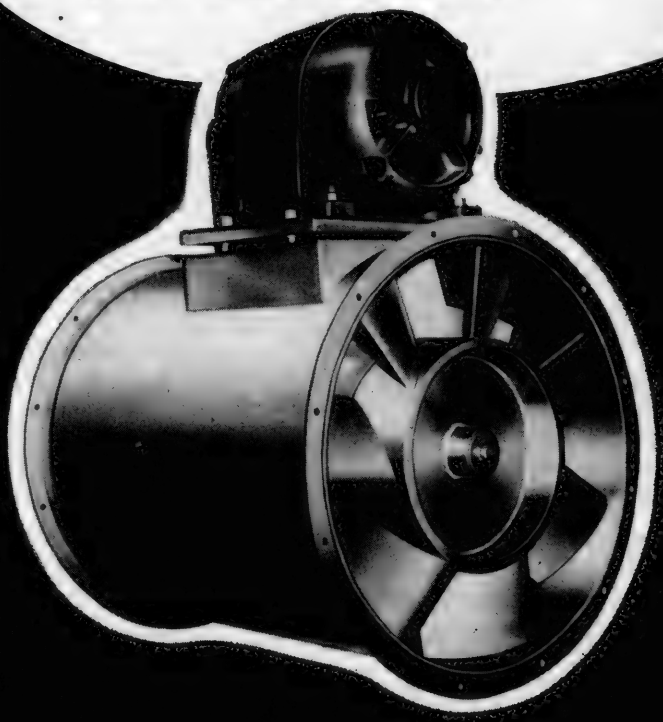
The increase in retail anthracite sales for space heating, by far the fuel's principal market, is attributed to a renewed interest in hard coal heat on the part of domestic consumers and operators of apartment houses, schools, and commercial buildings as the result of developments in automatic anthracite burning equipment. Sales of this new equipment are running 250% ahead of the 1953 sales and have shown increases for 27 consecutive months.

(*News of the Month concluded on page* 196)

7 REASONS WHY

Hartzell Vaneaxial Blowers

- LAST LONGER
- DO A BETTER JOB



Belt-drive model (shown) available in sizes from 12" to 54", standard or high-temperature construction. Also available in direct-drive models, 18" to 42". These blowers operate efficiently against pressures as high as 10", deliver up to 87,000 CFM. For complete details, write for Bulletin A-110 or call your nearby Hartzell field engineer.

- Heavier gauge steel throughout — outer shell steel ranges from 14 gauge on 12" models to ¼" plate on 54" models — to evaluate strength of construction, compare net weights before you buy.
- Precision-cast, aluminum alloy impeller, dynamically balanced to prevent vibration.
- All-welded construction — guide vanes are welded to both inner and outer shells — there's nothing to work loose and vibrate.
- Certified ratings—all Hartzell blowers are tested for air deliveries according to the Standard Test Code.
- Easy maintenance—ball bearing pillow blocks are Alemite lubricated from outside the duct section — belts can be changed by removing one small plate.
- Belts totally enclosed to prevent damage by elements in the air stream . . . yet easily adjusted by turning two bolts.
- Top quality motors supplied by nationally recognized manufacturers.

Why You Can Count on Hartzell Air-Moving Equipment for Long Life, Rugged Reliability and Minimum Maintenance

Hartzell fans and blowers are engineered and built for the exacting requirements of tough industrial service. There's no compromise with quality for the sake of shaving a few dollars on price. Hartzell fans are designed for the industrial buyer who is willing to pay for long life, dependable service and low maintenance.

HARTZELL
PROPELLER FAN CO.

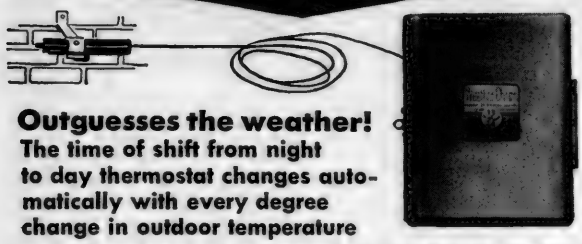
Div. of Castle Hills Corp.

103 Thomas Blvd. • Piqua, Ohio

ENGINEERING OFFICES IN PRINCIPAL CITIES

NEW Weather Reset time switch makes all heating control systems

FULLY AUTOMATIC



Outguesses the weather!
The time of shift from night to day thermostat changes automatically with every degree change in outdoor temperature

THE WEATHER-CHRON

You can have the best room thermostat, use zone or individual room controls, or even outdoor-type heat controls, BUT—unless you use a "Weather Reset" time switch to automatically change the time of starting heat flow in the morning, you will *NOT* have automatic temperature control.

The WEATHER-CHRON is the automatic time switch that takes all guess-work out of "setting the time switch." It is *MORE* than just a time switch, and yet is installed and connected into any thermostat circuit exactly as is any ordinary time switch in any heating or air conditioning control circuit. It has a temperature-sensitive bulb like that of an indoor-outdoor thermometer that is placed outdoors where it constantly measures outdoor temperatures. Instead of just showing what the outdoor temperature is, it:—

Changes the time heating starts as outside temperatures change.

Permits the thermostat (all types) to control heat flow during the day.

Stops heat flow as outdoor temperatures rise above 65°F.

Shuts down heating earlier in mild weather—later in cold weather.

Turns heat back on at night when outdoor temperature drops below selected low levels.

One-day and seven-day models are available as is a double switch model for use with outdoor-type controls that provides a high temperature morning build-up period before switching to the outdoor controller. All-electric or electric with 30-hour spring carry-over clock action is available.

AUTOMATIC DEVICES CO., INC.
714 Hillgrove Avenue • Western Springs, Illinois
Please send complete descriptive literature on:
☐ WEATHER-CHRON, the "Weather Reset" Time Switch.
☐ Outdoor-type space heating controls.
Name_____
Address_____
Firm_____
City_____
Zone_____ State_____

(*Concluded from page* 194)

NEW JERSEY BUILDING CODE

supplemented by addition of sections on air conditioning, mechanical ventilation, and refrigeration.

Additional parts of the Standard Building Code of New Jersey have been adopted and copies filed with the Secretary of State, according to an announcement today by Joseph E. McLean, Commissioner of the New Jersey Department of Conservation and Economic Development.

Commissioner McLean says the parts adopted are: Part C—elevators, motor stairways (escalators), dumbwaiters and conveyor equipment; Part D—air conditioning, mechanical ventilation and refrigeration; and Part F—electrical equipment and wiring. The parts, together with parts previously adopted, embrace the Standard Building Code of New Jersey.

• **HOME RULE MAINTAINED**—Laws which authorize the Department to prepare the standard code state in part, "any municipality may adopt the code, and any amendments thereto, by ordinance, without incorporating the same in the ordinance, provided reference is made therein to the code as the 'Standard Building Code of New Jersey.' "

In adopting Parts C, D and F, Commissioner McLean stressed the fact that the Principle of home rule is retained in the code, which continues to grant certain discretionary powers to the local building official, provides for local boards of appeal, fixing of fees, and other features designed to facilitate its use.

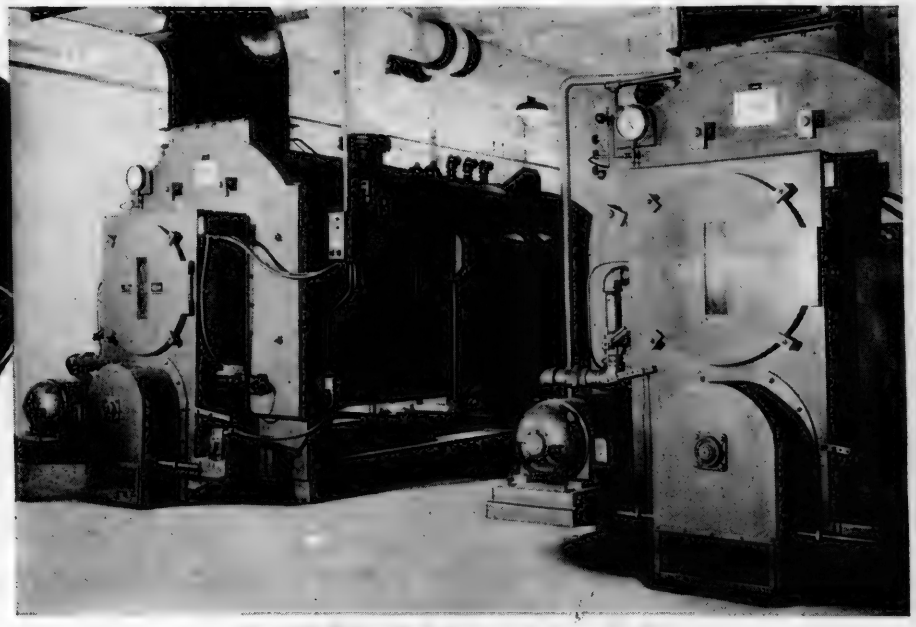
AIR CONDITIONING EQUIPMENT

manufacturers are expected to benefit from test program involving comfort engineered homes.

Manufacturers of air conditioning equipment are expected to benefit from a test program conducted by Owens-Corning Fiberglas Corp. which seeks to determine whether a comfort engineered house can be heated and air conditioned all year for an average of $10 a month. Statistics already compiled on 100 of 172 homes entered in the program come close to substantiation of this claim: figures show monthly heating and cooling costs to be $10.70 or less than 7 per cent above the target.

• **SAVINGS**— When compared with houses constructed to meet minimum FHA requirements, these dwellings show savings in heating and cooling of from $3.73 a month in the North to $5.67 a month in the South. With the average size home of 1200 sq ft heated and cooled for only $10 a month, air conditioning is said to be within the financial reach of almost every American home owner. The home owner also benefits from initial savings on air conditioning equipment. Through use of comfort engineering principles, the capacity of the unit can be reduced, in most instances, by one or two tons. The trend indicates vastly larger markets than could be developed with the more expensive units.

"No engineer likes a gamble. That's why I want the UNFAILING DEPENDABILITY of Packaged Boilers"



Two 175-HP Gas-Fired Continental Automatic Boilers, installed at Tri-County Joint School District, Canton, Pa.

"As an engineer, I can't afford to take a chance. So when we design a modern heating plant, I make certain we get dependability. In fact, that's why I insist on Packaged Boilers.

"Heating, power and process requirements are always of vital importance. That's why two Packaged Boilers, each designed to carry 75% of the maximum demand, may very well be a better buy than one built-up firebox type of boiler. Sure, that's conservative designing. But it pays off in winter-long reliability, no matter what the weather.

"Later, if new buildings are added or there's some other need for increased steam production, it's easy and economical to install another Packaged Boiler. So we not only get dependability, but flexibility, too. That kind of a package makes everybody happy."

Six Reasons Why it Pays to Buy a CONTINENTAL Automatic Boiler

* Guaranteed 80% efficiency . . . Fire-tested before shipment . . . Range, 20 to 500 hp.
* Simple, practical two-pass design, for uniform flow of combustion gases through all return tubes.
* Maximum radiant heat transfer achieved by "Spinning Gas" technique for thorough mixing of air and atomized fuel.
* High-CO_2 and low-temperature stack gases — proof of high combustion efficiency.
* Free, rapid water circulation improves heat transfer, keeps heating surfaces clean.
* Easy access to furnace and all return tubes. Refractory baffles and brickwork are not required.

For details on the Continental Automatic Boiler, send for Bulletin BE-3

BOILER ENGINEERING & SUPPLY COMPANY, INC.

7 Manavon Street, Phoenixville, Pa.

A HALF CENTURY OF BOILER MANUFACTURING EXPERIENCE

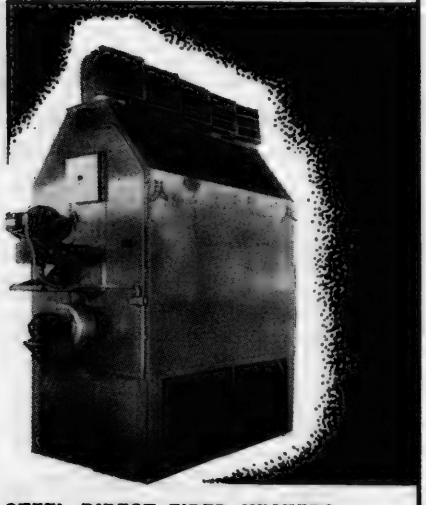
The Continental AUTOMATIC BOILER

Inquire

ABOUT AN
OLSON HEATER
BEFORE YOU DECIDE

OLSON BUILDS ITS REPUTATION IN EVERY HEATER . . .

You will find Olson Heaters in plants warehouses, factories, wherever the best equipment is employed and you'll find them all over the nation. Each one is a tribute to Olson's outstanding performance, its ability to keep performing efficiently, year after year. Write for complete information and data before you decide.



STAINLESS STEEL DIRECT FIRED HEATERS
GAS, OIL, OR DUAL GAS AND OIL
CAPACITIES FROM 300,000 TO 2,000,000 BTU

Olson

ARTHUR A. OLSON & COMPANY
Canfield, Ohio

REPRESENTATIVES
IN PRINCIPAL CITIES

Canadian Degree Days for November and December, 1956*

City	November		December	
	1956	Normal**	1956	Normal**
Calgary, Alta.	907	1110	1409	1430
Charlottetown, P.E.I.	805	850	1246	1210
Crescent Valley, B. C.	1044	990	1193	1220
Edmonton, Alta.	943	1220	1599	1660
Fort William, Ont.	1110	1170	1661	1680
Grande Prairie, Alta.	978	1300	1653	1750
Halifax, N. S.	642	745	1027	1109
London, Ont.	801	840	1048	1200
Medicine Hat, Alta.	929	1070	1304	1440
Moncton, N. B.	877	910	1329	1340
Montreal, P. Q.	883	910	1317	1390
North Bay, Ont.	1005	1080	1541	1550
Ottawa, Ont.	903	970	1370	1460
Penticton, B. C.	877	820	1048	1050
Prince George, B. C.	1107	1110	1408	1440
Quebec City, P. Q.	989	990	1490	1530
Regina, Sask.	1193	1290	1735	1740
St. John, N. B.	829	880	1269	1300
Saskatoon, Sask.	1196	1320	1787	1790
Timmons, Ont.	1123	1270	1811	1740
Toronto, Ont.	710	777	1012	1126
Vancouver, B. C.	717	650	797	810
Victoria, B. C.	658	600	758	730
Windsor, Ont.	754	780	960	1130
Winnipeg, Man.	1137	1255	1784	1778

* These data are supplied through the courtesy of the Meteorological Division Air Service Branch, Department of Transport, Canada.
** New normal figures covering 30-year period, 1921 to 1950.

COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available

INDUSTRIAL VENTILATION CONFERENCE—Sixth annual Industrial Ventilation Conference, to be held at Kellogg Center, Michigan State University, East Lansing, Mich. Public relations department of Michigan State, E. Lansing, Mich. ..... **FEBRUARY 18-21, 1957.**

ASHAE MEETING—63rd annual meeting of the American Society of Heating and Air-Conditioning Engineers, Inc., at the Conrad Hilton Hotel, Chicago, Ill. A. V. Hutchinson, executive secretary of the Society, 62 Worth St., New York 13, N. Y. ..... **FEBRUARY 25-28, 1957.**

HEATING AND AIR-CONDITIONING EXPOSITION—13th International Heating and Air-Conditioning Exposition, at the International Amphitheatre, Chicago, Ill. E. K. Stevens, manager, International Heating and Air-Conditioning Exposition Co., 480 Lexington Ave., New York 17, N. Y. ..... **FEBRUARY 25-MARCH 1, 1957.**

CORROSION ENGINEERS MEETING— 13th annual conference and exhibition of the National Association of Corrosion Engineers, at Kiel Auditorium, St. Louis, Mo. A. B. Campbell, executive secretary of the Association, 1061 M & M Building, Houston 2, Tex. ..... **MARCH 11-14, 1957.**

NUCLEAR CONGRESS—1957 Nuclear Congress to be held at Convention Hall, Philadelphia, Pa. Engineers Joint Council, 29 W. 39th St., New York 18, N. Y. ..... **MARCH 11-15, 1957.**

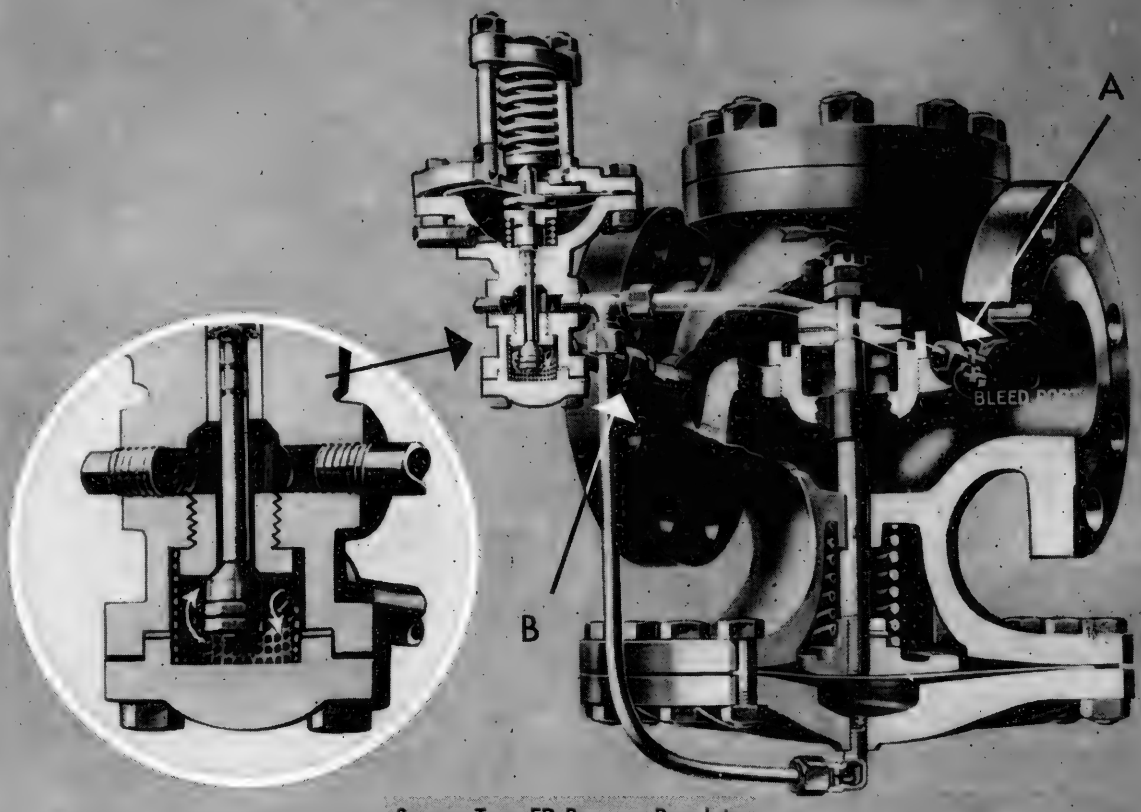
ATOMIC ENERGY CONFERENCE— Fifth conference on Atomic Energy in Industry, sponsored by the National Industrial Conference Board, at the Benjamin Franklin Hotel and Convention Hall, Philadelphia, Pa. Public information department of the National Industrial Conference Board, 460 Park Ave., New York 22, N. Y. ..... **MARCH 14-15, 1957.**

METEOROLOGICAL MEETING—151st National meeting of the American Meteorological Society, to be held at the University of Chicago, Chicago, Ill. Executive secretary of the Society, 5 Joy St., Boston 8, Mass. ..... **MARCH 19-21, 1957.**

(*Concluded on page* 200)

VALVE TIPS:

Advantages of External Pilots in Automatic Regulating Valves



Spence Type ED Pressure Regulator

"Maintenance-free, trouble-free, install-and-forget." They're all pretty phrases, but every engineer knows from experience they don't apply to regulating valves. Any valve designed to control temperatures or pressures within tight limits can be affected by dirt or other foreign matter in steam lines.

One advantage of the external pilot mounting shown above is simplified maintenance. Trouble shooting is faster, downtime is reduced, and tempers don't take such a beating. Here's why:

If trouble develops, it's easy to find out if it's in the pilot or the main valve. Just remove the tubing bend at A. A simple test, without any instruments or other equipment, shows where the trouble is.

If the trouble is in the pilot, you can remove it by disconnecting the unions at B. There's no need to take the main valve out of the line.

The quickest way to get the regulator functioning again is to install a spare pilot. This is easy — and in the Spence design it's not expensive to carry spare pilots. Spence pilots fit all sizes of Spence main valves. There's no need to stock an expensive inventory of pilots for each main valve size.

In the enlarged sectional drawing above, you can see how the strainer, seat and disc of the pilot are readily accessible by removing the blind flange.

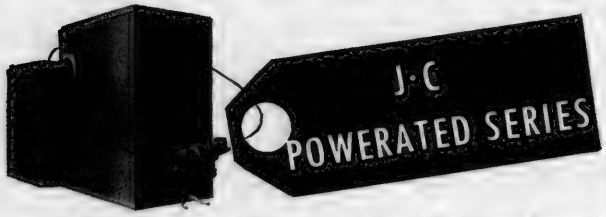
If the trouble is in the main valve, here again inspection is easy. If there's dirt in the steam line, it may clog the bleed port or restriction orifices. In the Spence design these can be inspected and cleaned by merely removing the tubing connections. The seat and disc of the main valve can also be inspected easily by removing the top flange.

These maintenance advantages, plus other advanced design features, are available for a wide range of regulating applications. For information on Spence's wide range of different automatic regulating valves, write for your copy of Bulletin 1005.

SPENCE ENGINEERING COMPANY, INC.
Walden, New York

JACKSON & CHURCH FURNACES

HANDLE DIFFICULT HEATING JOBS



Jackson & Church engineering has produced a new Powerated furnace line which matches today's heaviest duty requirements. These new furnaces develop static pressures up to 1½" W. C. with lock-seam, leakproof casings designed to carry the heaviest air load over the unit for air conditioning. Oil, gas or dual-fuel firing with outputs from 152,000 to 3,800,000 Btu. The J-C Powerated Series incorporates the latest advances in modern industrial and commercial heating.

Available for heating plants, stores, churches, schools and other large structures, these new gas-fired models have inputs of 200,000 to 400,000 Btu, with some units approved either as horizontal furnaces or as blower type heaters. These J-C units provide the convenience of gas firing plus all the advantages of suspended type heating such as savings in floor space and almost limitless zone heating possibilities. Drawer type burners for easy accessability, easy installation. J-C gas-fired suspended furnaces are built for minimum maintenance.

Space-saving oil-fired suspended models, available in a wide range of sizes with outputs of 89,000 up to 1,000,000 Btu, these easily installed units are most versatile in application. They can be installed singly or in batteries, and can supplement other heating for plant expansion and they are readily adapted to year round air conditioning. These dependable units solve many commercial and industrial heating problems.

With outputs from 400,000 to 2,000,000 Btc, and available for oil, gas or dual-firing, J-C Direct-Fired units are ideally adapted for large commercial or industrial heating jobs. They may be installed on the floor, or suspended either inverted or horizontally. They are self contained, automatically controlled units equipped with induced draft fan and air circulating blowers. J-C Direct-Fired Unit design makes savings possible in both installation and maintenance costs.

Visit the J-C exhibit, space 846-850 — 13th International Heating and Air Conditioning Exposition — International Amphitheatre February 25 to March 1, 1957.

J-C | JACKSON & CHURCH — FURNACE DIVISION
Saginaw, Michigan

(*Concluded from page* 198)

METALS CONGRESS AND EXPOSITION—10th Western Metal Congress and Exposition, sponsored by the American Society for Metals, and other technical groups, at the Pan-Pacific Auditorium and the Ambassador Hotel, Los Angeles, Calif. W. H. Eisenman, managing director of the Society, 7301 Euclid Ave., Cleveland 3, Ohio. ..... **MARCH 25-29, 1957.**

AMERICAN POWER CONFERENCE—19th annual conference sponsored by Illinois Institute of Technology in cooperation with 14 universities and technical societies at Hotel Sherman, Chicago, Ill. Secretary, E. R. Whitehead, Illinois Institute of Technology, 3300 Federal St., Chicago 16, Ill. ..... **MARCH 27-29, 1957.**

GAMA MEETING—Annual meeting of the Gas Appliance Manufacturers Association, at The Greenbrier, White Sulphur Springs, West Va. H. Leigh Whitelaw, managing director of the Association, 60 E. 42nd St., New York, N. Y. ..... **APRIL 8-10, 1957.**

WARM AIR HEATING SHORT COURSE—1957 Warm Air Heating Short Course, sponsored by Purdue University, West Lafayette, Ind., to be held at the University. Prof. F. B. Morse, School of Mechanical Engineering, Purdue University, West Lafayette, Ind. ..... **APRIL 15-18, 1957.**

AIHA CONVENTION—Annual convention of the American Industrial Hygiene Association, at the Sheraton Jefferson Hotel, St. Louis, Mo. Secretary of the association, 4400 Fifth Ave., Pittsburgh 13, Pa. ..... **APRIL 22-26, 1957.**

REFRIGERATION INSTITUTE MEETING—Annual meeting of the Air-Conditioning and Refrigeration Institute, at The Homestead, Hot Springs, Va. Executive secretary of the Institute, 1346 Connecticut Ave., N. W., Washington, D. C. ..... **MAY 6-8, 1957.**

MECHANICAL CONTRACTORS MEETING—Annual meeting of The Mechanical Contractors Association of America (formerly Heating, Piping and Air Conditioning Contractors National Association) at the Hotel Fontainebleau, Miami Beach, Fla. L. B. Gruman, Jr., secretary of the Association, 30 Rockefeller Plaza, New York 20, N. Y. ..... **MAY 7-10, 1957.**

DESIGN ENGINEERING SHOW—Design Engineering Show to be held at the Coliseum, New York City. Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y. ..... **MAY 20-23, 1957.**

NDHA MEETING—48th annual meeting of the National District Heating Association, at The Homestead, Hot Springs, Va. J. F. Collins, Jr., secretary-treasurer of the Association, 827 N. Euclid Ave., Pittsburgh, Pa. ..... **JUNE 3-6, 1957.**

ASRE CONVENTION—44th annual meeting of the American Society of Refrigerating Engineers, at Hotel Fountainebleau, Miami, Fla. Secretary of the Society, 234 Fifth Ave., New York 1, N. Y. ..... **JUNE 3-6, 1957.**

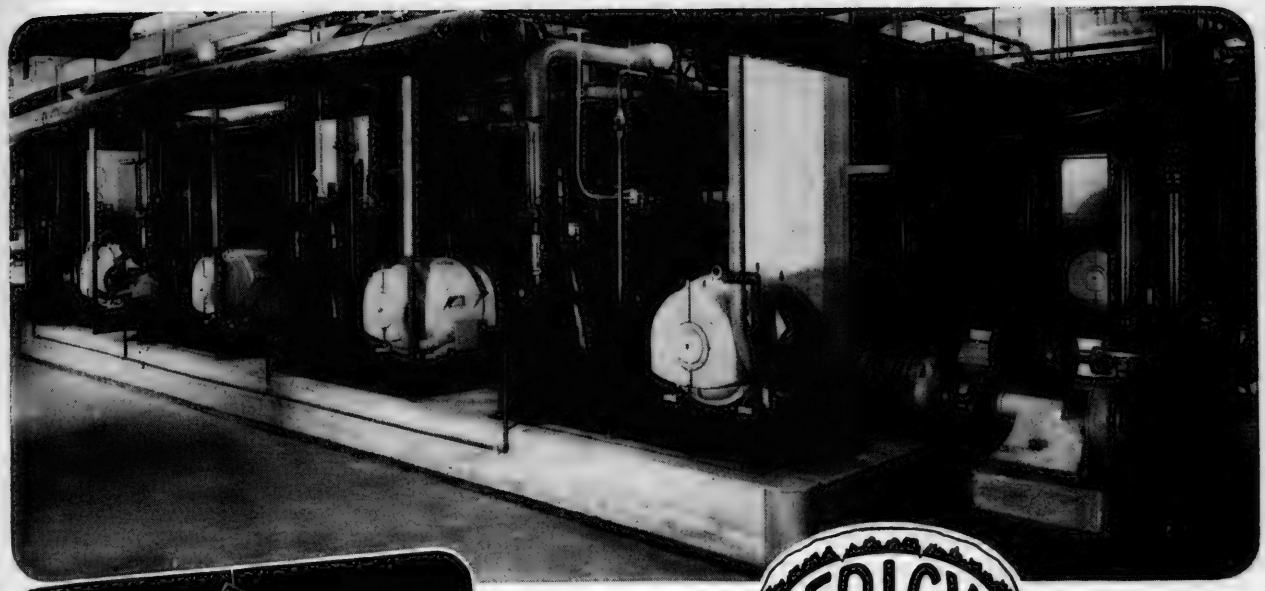
TESTING MATERIALS MEETING—60th annual meeting of the American Society for Testing Materials, at the Chalfonte-Haddon Hall, Atlantic City, N. J. Secretary of the Society, 1916 Race St., Philadelphia 3, Pa. ..... **JUNE 16-21, 1957.**

ASHAE MEETING—Semi-annual meeting of the American Society of Heating and Air-conditioning Engineers, Inc., at Murray Bay, Quebec. A. V. Hutchinson, executive secretary of the Society, 62 Worth St., New York 13, N. Y. ..... **JUNE 24-27, 1957.**

CIVIL ENGINEERS EXHIBIT—Annual meeting and Civil Engineering Show of the American Society of Civil Engineers at Hotel Statler, New York, N. Y. Secretary of the Society, 33 W. 39th St., New York 18, N. Y. ..... **OCTOBER 14-18, 1957.**

INDUSTRIAL DEVELOPMENT CONFERENCE—International Industrial Development Conference, sponsored jointly by Time-Life International, and Stanford Research Institute, at the Fairmount Hotel, San Francisco, Calif. E. S. Prentice, executive secretary, Stanford Research Institute, Menlo Park, Calif. ..... **OCTOBER 14-18, 1957.**

AIR-CONDITIONING AND REFRIGERATION EXPOSITION — 10th exposition of the Air-Conditioning and Refrigeration industry, sponsored by the Air-Conditioning and Refrigeration Institute, at Chicago's International Amphitheatre, Chicago, Ill. Secretary of the Institute, 1346 Connecticut Ave., N. W., Washington 6, D. C. ..... **NOVEMBER 18-21, 1957.**



TRADE FRICK MARK®

Air Conditioning

SERVES AMERICAN NATIONAL INSURANCE CO., GALVESTON

The 11-story buildings of American National Insurance are kept cool and comfortable by eight Frick "ECLIPSE" compressors, shown above with condensers, water coolers, pumps and other auxiliaries. . . . There are "ECLIPSE" compressors to handle any load, with any refrigerant, at any temperature.

These handsome buildings house a staff of over 1000 people for American National, which was organized in 1905 and now has in force more than three billion dollars of insurance.

Both buildings were recently air conditioned completely by Decker and Roberts, Frick Distributors in Fort Worth, using among other things eight "ECLIPSE" refrigerating machines. These compressors have the exclusive Frick nine-cylinder design.

Fine buildings require fine equipment. You get the ultimate in air conditioning and refrigerating machinery when you specify "FRICK." Write for estimates and Bulletin 100 today.

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

WAYNESBORO, PENNA. U.S.A.

MEASURE

ACTUAL AIR DELIVERY

with

Alnor®

VELOMETER

A simple, direct reading on the Alnor Velometer gives you instant measurement of actual air delivery in any distribution system. This fast, precise method eliminates the time and money wasted in trial-and-error balancing...the profit-eating call-backs so often necessary with other less precise measurements.

The Velometer is the only instantaneous, direct reading air velocity meter—accurate in all ranges, from high to low... compact, portable, easy to understand and use. Wide assortment of jets and fittings makes this precision instrument ideally suited for all air velocity measurement.

First Choice of Industry

Take the recommendation of every major manufacturer of air diffusers and leading contractors—get an Alnor Velometer. You'll save time and money on the next installation you balance.

Alnor

PRECISION INSTRUMENTS FOR EVERY INDUSTRY

Illinois Testing Laboratories, Inc.
Room 514, 420 No. LaSalle St.
Chicago 10, Ill.

Please send Velometer Bulletin 2448-G.

Name.....

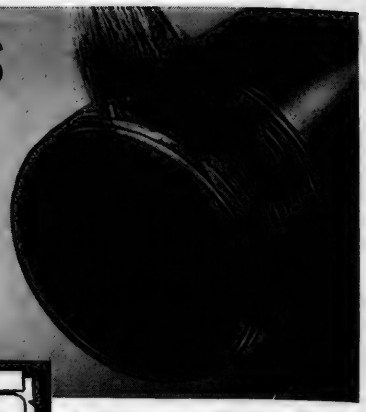
Company.....

Address.....

City.....Zone.....State.....

IT COSTS LESS TO USE THE BEST!

PLS



1. Takes less PLS to give a perfect seal.

2. One compound for many services: water...oil...gas... steam...chemicals...petroleum products—low and high pressures.

3. Never washes out—one application lasts forever.

4. Never hardens: joints may be easily broken after years of service—no damaged connections.

For your convenience: available in handy 1-lb. brush top cans.

Prove it to yourself. Send for a free sample. Crane Packing Co., 6431 Oakton St., Morton Grove, Ill., (Chicago Suburb)

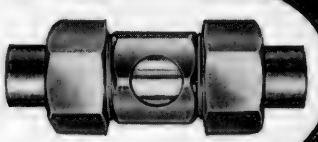
JOHN CRANE — CRANE PACKING COMPANY

In Canada: Crane Packing Co., Ltd., Hamilton, Ont.

NEW! "250" SERIES LIQUID EYE®

POSITIVE SEALING INDICATORS

designed to save you even more time and money



6 sizes, now available: 3/8", 1/2", 5/8", 7/8", 1 1/8" and 1 3/8" O.D.S.

The new "250" has all the proved Liquid Eye advantages *plus* these newly engineered features:

- **smaller—more compact, simplified design.**
- **preformed copper extension eliminates need for separate gaskets—*foolproof* installation.**
- **complete, self-contained, economy unit.**

Ask your wholesaler now.

Write today for catalog covering the complete Allin line.

Allin — ALLIN MANUFACTURING CO.
410 N. Hermitage Ave. • Chicago 22, Illinois
Over 1 000 000 Liquid Eyes Sold to Date!

More and more air conditioning specifications call for Worthington Induction Systems

LOUISIANA STATE CAPITOL

- Exceptionally quiet operation
- Small, space-conserving ducts
- Individual room or occupant control
- Draft-free air distribution
- Positive ventilation
- Remote location of all mechanical equipment
- Minimum, centralized maintenance
- Flexibility of partition changing.

WORTHINGTON

CLIMATE ENGINEERS TO INDUSTRY, BUSINESS AND THE HOME

A few of the many modern American buildings for which the new Worthington high pressure induction air conditioning system has been specified.

CHESAPEAKE & POTOMAC TELEPHONE CO., RICHMOND, VA.
Engineer: Baskerville & Son, Richmond, Va.
Architect: Same
Contractor: Wachter & Wolff, Richmond, Va.

N. Y. STOCK EXCHANGE BUILDING (20 BROAD ST.) NEW YORK, N. Y.
Engineer: Jaros, Baum & Bolles, New York, N. Y.
Architect: Kahn & Jacobs & Sidney Goldstone, New York, N. Y.
Contractor: Raisler Corp., New York, N. Y.

UNIVERSITY OF NEBRASKA LINCOLN, NEBRASKA
Engineer: Carl Goth, Omaha, Nebraska
Architect: Hazen & Robinson, Lincoln, Neb.
Contractor: Ray Martin Co., Lincoln, Neb.

LACKLAND AIR FORCE BASE SAN ANTONIO, TEXAS
Architect: Associated Architects, Houston, Texas & York & Sawyer, New York, N. Y.
Contractor: C. Wallace Plumbing Co., Houston, Texas

LIFE & CASUALTY INSURANCE CO. NASHVILLE, TENN.
Engineer: Burns & Thorpe, Memphis, Tenn.
Architect: Edwin A. Keeble Assoc., Inc., Nashville, Tenn.
Contractor: Buchi Plumbing Co., Nashville, Tenn.

MUTUAL BENEFIT INSURANCE CO. NEWARK, N. J.
Engineer: Syska & Hennessy, Inc., New York, N. Y.
Architect: Eggers & Higgins, New York, N. Y.
Contractor: Mance Corp., New York, N. Y.

TRAVELERS INSURANCE CO. HARTFORD, CONN.
Engineer: Jansen & Rogan, New York, N. Y.
Architect: Voorhees, Walker, Smith & Smith, New York, N. Y.
Contractor: Alvord & Swift, New York, N. Y.

LOUISIANA STATE CAPITOL BATON ROUGE, LA.
Engineer: De Laureal & Moses, New Orleans, La.
Architect: Dreyfus, Seiferth & Gibert, New Orleans, La.
Contractor: James F. O'Neil, New Orleans, La.

BANK OF NEW YORK NEW YORK, N. Y.
Engineer: Voorhees, Walker, Smith & Smith, New York, N. Y.
Architect: Same
Contractor: J. L. Murphy, Inc., New York, N. Y.

AMERICAN MUTUAL HARDWARE INSURANCE CO. MINNEAPOLIS, MINN.
Engineer: Thorshov & Cerny, Minneapolis, Minn.
Architect: Same
Contractor: Spencer Air Conditioning Co., Minneapolis, Minn.

QUINCY MUTUAL FIRE INSURANCE CO., QUINCY, MASS.
Engineer: Cram & Ferguson, Boston, Mass.
Architect: Same
Contractor: C. P. Blouin, Boston, Mass.

ILLINOIS POWER CO. DECATUR, ILL.
Engineer: Holabird & Root & Burgee, Chicago, Ill.
Architect: Same
Contractor: R. H. Bishop Co., Champaign, Ill.

Profit by the experience of these architects, engineers, and contractors. Specify Worthington High Pressure Induction Air Conditioning for your next building. Be sure you're getting the very best. For complete details, write: Worthington Corporation, Section A.6. 124, Harrison, New Jersey.

for your convenience / **SPRAY NOZZLES**
and all related accessories for
HUMIDIFYING / from a single, dependable source

PRECISION PNEUMATIC ATOMIZING NOZZLES

ACCESSORIES SUCH AS AIR FILTERS, HUMIDISTATS, SOLENOID VALVES, PRESSURE REGULATORS

COMPACT HUMIDIFYING UNITS

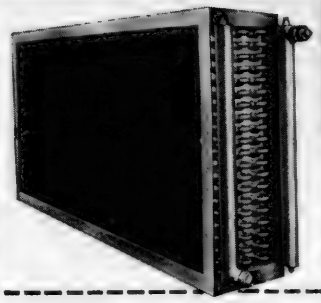
For industrial installations of every size Spraying Systems offers all needed equipment . . . everything but the piping, wiring and compressor. Provides high efficiency, dependable system; only two components have moving parts. Engineered for easy installation and simplified maintenance.

WRITE FOR Bulletin 82 . . . spray nozzles, assemblies and parts for manual or automatic humidifying systems.

ALSO SUPPLIED . . . spray nozzles for evaporative condensers, air washers, cooling towers, spray ponds and roof cooling systems.

SPRAYING SYSTEMS CO.
3261 RANDOLPH STREET • BELLWOOD, ILLINOIS
ADVANCED SPRAY NOZZLE DESIGN FOR NEW DIMENSIONS IN CONTROL AND PERFORMANCE

. . . BUILT FOR
Outstanding Performance

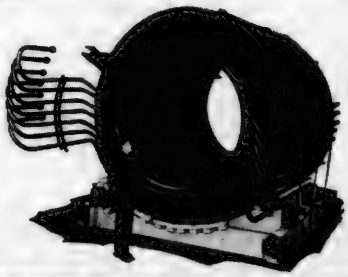


REMPE COILS
Designed to rigid specifications to insure long, trouble-free life.

FIN TYPE COILS
For Air Conditioning, Refrigeration and Heating — available in copper or steel hot galvanized — any size, any style.

PIPE COILS
Complicated assemblies or production runs of coils or bends from any type of pipe or tubing.

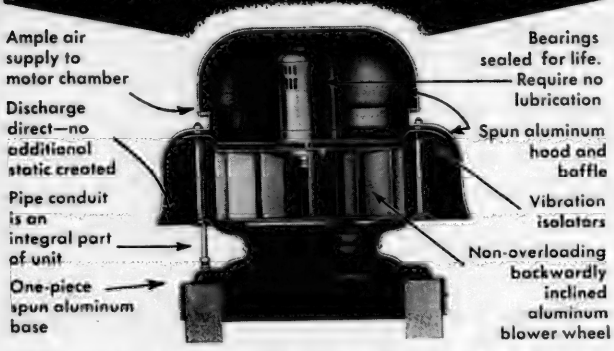
Send details for prompt quotation



HEAT TRANSFER EQUIPMENT REMPE CO. Founded 1890

REMPE COMPANY
358 N. Sacramento Blvd.
Chicago 12, Illinois

All-Aluminum Cook Ventilators


Ample air supply to motor chamber
Discharge direct—no additional static created
Pipe conduit is an integral part of unit
One-piece spun aluminum base
Bearings sealed for life. Require no lubrication
Spun aluminum hood and baffle
Vibration isolators
Non-overloading backwardly inclined aluminum blower wheel

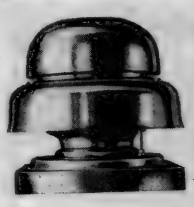
MODEL BV DIRECT DRIVE VENTILATOR
7" to 24" sizes (390 to 5,020 cfm)

All-aluminum construction decreases roof loads. Handsome low silhouette design is available in direct or belt drive. Light starting torque of aluminum blower wheel increases bearing and motor life (and belt life on belt drives). Non-sparking, non-overloading blower wheel.

Motors of all models are outside air stream.

Write for Catalog, or see Sweet's Architectural File for condensed catalog.

In Canada write to H. F. Clarke, Ltd., 244 W. Broadway, Vancouver, B. C.



Same appearance in belt drive up to 16,500 cfm.

COOK VENTILATORS
LOREN COOK COMPANY
Berea, Ohio

MARCH CONDENSATE PUMPS

• EASIEST INSTALLATION — COMPACT TO FIT ANY UNIT
• ENDS YOUR PUMP PROBLEMS — EXCLUSIVE AIR BLEED DESIGN

Condensate drain systems at a fraction of the cost of gravity lines. Compact "in-pan" mounting. Fundamentally NEW and EXCLUSIVE pump design (patents applied for). Cycles with compressor, fan or defrost control. Runs dry. Positive priming. Thermal protected. Complete line for every need.

MODEL A—handles vertical lift up to 6 feet, horizontal to 220 feet.

MODEL C—(left) vertical lifts up to 21 feet, horizontal to 300 feet.

MODEL B—for vertical lifts to 9 feet, horizontal runs to 300 feet.

Complete line for system cycling or float valve control. Write for bulletins and data.

MARCH MANUFACTURING CO., INC.
8017 North Lawndale • Skokie, Illinois

the Power-Packed "UNIMOUNT" line

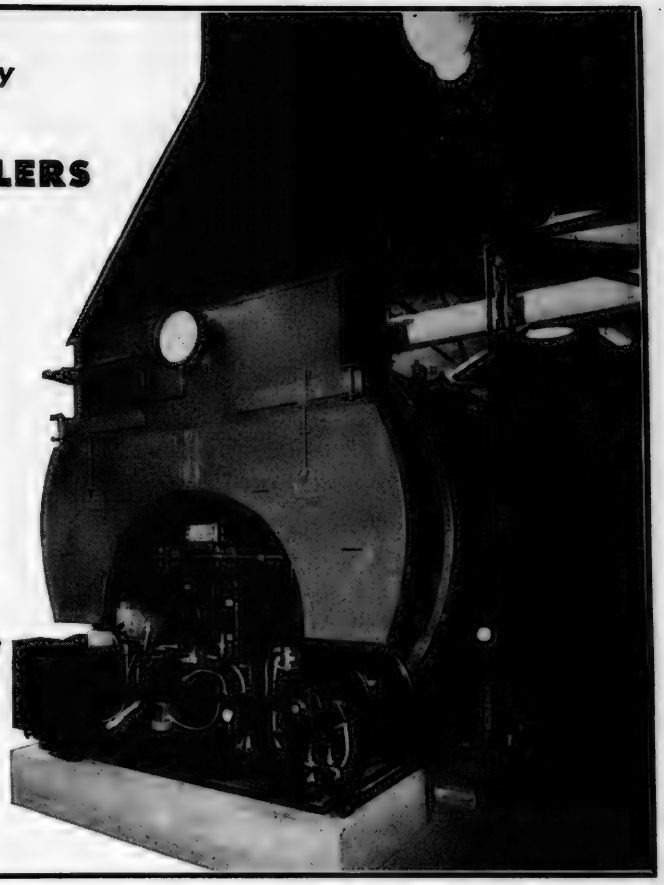
BISON

Dependable quality since 1863 . . . . .

POWER BOILERS

Throughout 93 years, Farrar & Trefts has been a leader in boiler design and construction. Today, as in yesteryear, F & T offers dependable, efficient, modern power boilers to satisfy the ever-increasing demands of institutional, apartment, office and industrial buildings. Under the same BISON brand, F & T also furnishes low-pressure boilers for heating purposes.

Proper selection of a boiler for the continuous delivery of required heat and power is a precise project, demanding the systematic approach of engineers long trained in this work. Engineers at F & T have this background of service and they welcome opportunities to evaluate the needs of boiler users.



Standard F & T Super Scot Power Boiler (150 lb. design pressure) with "Indiana Pack" burner at Mastic Asphalt Corp., South Bend, Ind. Furnished by Page Associates of Chicago. The Austin Co. were the Engineers and Contractors.

FARRAR & TREFTS DIVISION
ADSCO INDUSTRIES, INC.
20 MILBURN ST. BUFFALO 12, N. Y.

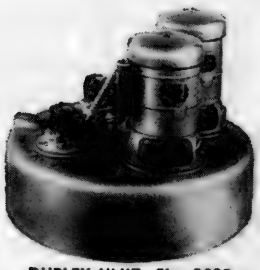
Low Return *Condensate Pumps*

Capacities 500 to 15,000 sq. ft. E.D.R.

SINGLE UNIT—Fig. 302A
10 Gal. Receiver for Single Units
Diameter 21"
Hgt. of Return above floor 6⅞"

weil TVC PUMP

LOW RETURN CONNECTION
LOW SPEED, LONG LIFE
CAST IRON RECEIVER
LOW WATER LINE
FLOAT SWITCH CONTROL



DUPLEX UNIT—Fig. 303B
15 Gal. Receiver for Single or Duplex Units
Diameter 25½"
Hgt. of Return above floor 7³⁄₁₆"

Unit Number	Max. Sq. Ft. Direct Radiation	Disch. Press. In Lbs. At Pump	GPM Radiation Will Condense	Capacity of Pump in GPM	Motor H.P.	Return Inlet in Inches	Pump Discharge in Inches	Diameter and Capacity of Receiver	Height of Return to Centerline
TVC-19	750	20	.38	1.5	¼	2	1	21" -10 Gal.	6⅞"
TVC-23	1000	20	.5	1.5	¼	2	1	21" -10 Gal.	6⅞"
TVC-29	2000	20	1.0	3.0	¼	2	1	21" -10 Gal.	6⅞"
TVC-35	4000	20	2.0	6.0	¼	2	1	21" -10 Gal.	6⅞"
TVC-41	6000	20	3.0	9.0	⅓	2	1	21" -10 Gal.	6⅞"
TVC-47	8000	20	4.0	12.0	½	2	1	25½"-15 Gal.	7³⁄₁₆"
TVC-52	10000	20	5.0	15.0	¾	2	1	25½"-15 Gal.	7³⁄₁₆"
TVC-54	15000	10	7.5	22.5	½	3	1¼	25½"-26 Gal.	10½"
TVC-55	15000	20	7.5	22.5	¾	3	1¼	25½"-26 Gal.	10½"
TVC-56	15000	30	7.5	22.5	1	3	1¼	25½"-26 Gal.	10½"
TVC-57	15000	40	7.5	22.5	1½	3	1¼	25½"-26 Gal.	10½"

Intermediate Sizes Based Upon Discharge Pressure Required Are Available.

See Bulletin TVC-300-C for Full Specifications

See Catalog in 1957 Sweet's and 1957 Domestic Engineering Catalog Directory

weil PUMP COMPANY • 1516 N. Fremont St. • Chicago 22, Illinois

Visit the weil display at the A.S.H. & V. Exposition — Feb. 25 - March 1.

MANUFACTURERS!

SEE IT! FEEL IT!

Get your QUOTATIONS on the

NEW

PEERLESS OF AMERICA

"UNIVERSAL K"

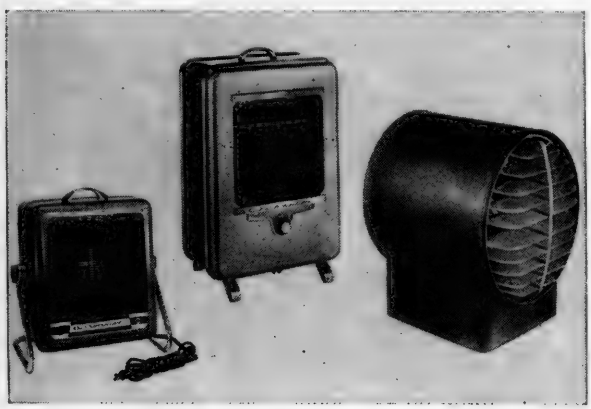
HEAT-X-CHANGE SURFACE

At BOOTH 751 –Heating & Air Conditioning Exposition, International Amphitheatre, Chicago–February 25th to March 1st.

The most talked about coil in the industry

PEERLESS OF AMERICA, INC.

5800 N. Pulaski Road • Chicago 30, Illinois, U.S.A.



Dependable, low-cost space heating where and when you need it

CHROMALOX Electric COMFORT HEATERS

You have a choice of blower, convection or radiant types of heating, all with Chromalox totally enclosed heating elements. Portable, mounted or built-in units—¼ to 40 kw. Automatic or manual controls.

Sizes and types for heating any size space—from a small spot or room to an entire building. Easy and economical to install and maintain.

Write for your copy of quick selector Catalog D-52 to get complete information on Chromalox Electric Comfort Heaters and their applications.

For information on the complete line of Chromalox Electric Heaters request Catalog 50.

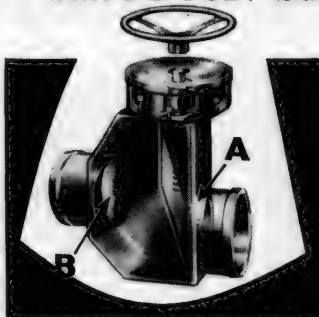
Let the Chromalox Sales Engineering staff solve your heating problems... electrically

Edwin L. Wiegand Company

7588 Thomas Boulevard, Pittsburgh 8, Pennsylvania A-4471

HERE'S HOW YOU CAN END BASEMENT FLOODING

with BOOSEY backwater valves



Manually-operated spade valve (A) and automatic swing valve (B) are two significant features of the Boosey backwater valve.

Basement flooding caused by back pressure from street sewers can be controlled by Boosey backwater valve #109. Even low-lying areas with overloaded sewers are no problem.

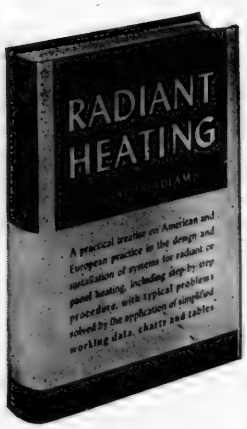
Other Boosey products—drains, grease interceptors, air gaps—all are designed to solve the problems you face every day. Select and install with confidence—write for Boosey catalog today.

NORMAN BOOSEY MFG. CO.

5283 AVERY AVE., DETROIT 8, MICH.

BOOSEY

(57-P-1)



- **Basic Principles**
- **Working Data**
- **Facts on Radiant or Panel Heating**

"Radiant Heating," by T. Napier Adlam, provides basic information plus working data necessary to design and install efficient systems . . . covers radiant heating with ceiling, wall and floor panels, using all types of fuels . . . shows step-by-step procedure in laying out systems, using simplified charts that give most of the essential data without calculation. If you want authoritative answers to radiant heating questions, you'll find time-saving, money-saving solutions to your problems in this book. Send for your copy today!

504 Pages **$6.00** **337 Illustrations**

(In Canada or overseas, $6.90)

THE INDUSTRIAL PRESS

93 Worth Street **New York 13, N. Y.**

DESIGNERS

4 MAJOR JOB ADVANTAGES

now offered by

DU PONT

•

Interesting, challenging, professional work assignments.

•

Long-range company programs assuring stability.

•

Promotion-from-within policy assuring opportunities for advancement.

•

Varied technical and administrative training programs.

•

IMMEDIATE OPENINGS FOR:

Heating & Ventilating Designers

Apply today for a position that will allow you to realize your full potential as a designer. Your work will be in a wide range of increasingly important fields.

Please send complete resume, including details of education and experience, to:

Mr. T. J. Donovan
Engineering Department

DU PONT

Better Things for Better Living
...through Chemistry

E. I. du Pont de Nemours & Co., Inc.
Wilmington 98, Delaware

CLASSIFIED ADVERTISING

MANUFACTURER'S REPRESENTATIVE An established manufacturer with 25 years experience producing ventilating equipment is looking for manufacturers' agents in many sections of the country to sell their new line of industrial fans.
The products include axial flow and tubeaxial fans, both direct and belt driven, and power roof ventilators.
Please reply Box 897, Air Conditioning, Heating & Ventilating, 93 Worth St., New York 13, N. Y.

Design Engineer

Medium size manufacturer of ventilating equipment has position available for graduate mechanical engineer, age 22-30, preferably with experience in designing fan wheels and blowers. Excellent opportunity for personable, capable young engineer with potential for management responsibility. Please send complete resume to Box No. 900, Air Conditioning, Heating & Ventilating, 93 Worth St., New York 13, N. Y.

DIRECT FIRED HEATER

Established Direct Fired Heater Company with complete line of accepted equipment suitable for use with oil, gas or combination fuels will entertain a merger or sale proposal. Key personnel available. Complete resume of operations furnished on request. Please reply to box 901, Air Conditioning, Heating & Ventilating, 93 Worth St., New York 13, N. Y.

Would you welcome extra income? Are you calling on metal-working industries? Then our new technical information srvice indispensable to plant engineers and management is your answer. To start, write at once with details, Box 902, Air Conditioning Heating & Ventilating, 93 Worth St., New York 13, N. Y.

For Sale—Sturtevant Silentvane Fan Size 125, 70,828 C.F.M. with 15 H.P. General Electric Motor, 3 speeds 3/60/220. Price $300. 6 Buffalo Forge Heating & Ventilating Fans 3-60", Fans 3-48", 3/60/220 Volts Complete. Direct connected Motors. Price $250 for Lot. M. Elstein, 426 Grand St., Jersey City 2, N. J.

Laboratory Technician
for
Research and Development Projects

Must be familiar with thermodynamics as applied to industrial and heating steam specialties. Excellent working conditions including pension plan, yearly bonus, paid vacation and holidays and other fringe benefits.
Send complete resume of education, experience and salary expected to:

SARCO MFG. CORP.
CLEWELL AND ITASKA STS.
BETHLEHEM, PENNSYLVANIA

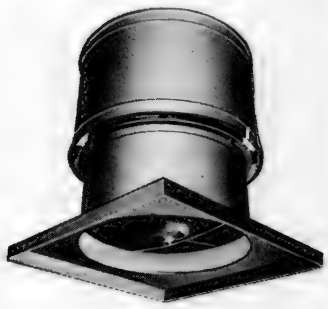
PRINTED FORMS available for immediate shipment. Heating & oil burner materials form, burner service record cards, service order forms, inspection information form, survey sheet and others, Send for samples—no obligation. Write Dept. AC, Degree Day Systems, Woodside 77, N. Y.

Manufacturer's Representatives needed for revolutionary new cooling tower. See ad page 152. Write Koch Engineering Company, 321 West Douglas, Wichita, Kansas or see us at Booth 1122, Heating and Air Conditioning Exposition.

Experienced engineering representative Metropolitan New York territory well acquainted consulting engineers and heating contractors desires one additional good line. Available for interview Chicago Heating Exposition February 26, 27 & 28. H. B. Eells, 853 Broadway, New York 3, N. Y.

FOR *Fast*

DISCHARGE of AIR at HIGH VELOCITY



allen

VERTICAL DISCHARGE FAN

• ***Keeps fumes from leaking back through building openings***

Whenever you face the problem of discharging fumes through a roof so that they will not short-circuit back through building openings, you'll find the solution in this Vertical Discharge Fan. It is designed especially for industrial applications that require the removal of a large volume at high velocity. It is fabricated of zinc-coated iron sheet with welded construction throughout. Automatic wing dampers open with air blast, close weather-tight when not operating. Available as "VD" direct drive with motor mounted inside air stream or as "VDR" with motor mounted outside throat of ventilator—both in a wide range of capacities and sizes.

See Sweet's Architectural File, Section 20b or write for catalog.

ALLEN ENGINEERED VENTILATION

ALLEN COOLER & VENTILATOR INC.
ROCHESTER, MICH.

Roof Ventilators for Every Industrial Need

FILL OUT AND SEND COUPON

ALLEN COOLER & VENTILATOR INC.
ROCHESTER, MICHIGAN

Please send me informative literature on your complete line of roof ventilators.

Firm _____
Name _____
Position _____
Address _____
City, State _____

ALPHABETICAL INDEX OF ADVERTISERS

A

Aerofin Corp. ..... *
Aerovent Fan Co., Inc. ..... *
Air Devices, Inc 179
Air Filter Corp. ..... *
Airtemp Construction Corp. 40
Alco Valve Co. 45
Allen-Bradley Co. 193
Allen Cooler & Ventilator Inc. 207
Allen, W. D., Manufacturing Co. 54-55
Allin Manufacturing Co. 202
Allis, Louis, Co. 189
Allis-Chalmers Manufacturing Co. .. 82
American Air Filter Co., Inc. 83-85
American Blower Corp. 72, 80
American District Steam Div., Adsco Industries, Inc. 49
Anderson, V. D., Co. 160
Anemostat Corp. of America 34-35
Armstrong Machine Works Inside Front Cover
Automatic Devices 196

B

Babcock & Wilcox Co., Boiler Div. .. 163
Barber-Colman Co. 58-59
Bell & Gossett Co. 70-145
Bethlehem Steel Co. 36
Binks Manufacturing Co. 178
Bishop & Babcock Mfg. Co. 149
Bituminous Coal Institute ..... *
Boiler Engineering & Supply Co., Inc. 197
Boosey, Norman, Mfg. Co. 206
Brunner Manufacturing Co. 63
Buensod-Stacey, Inc. 147
Buffalo Forge Co. 91
Byers, A. M., Co. 9

C

Carrier Corp. 158
Chicago Pump Co. 177
Clarage Fan Co. .....Inside Back Cover
Classified Advertisements 207
Cleaver-Brooks Co., Boiler Div. 89
Combustion Engineering, Inc. 16
Committee on Industrial Ventilation .. *
Cook, Loren, Co. 204
Copeland Refrigeration Corp. 157
Coyne & Delany Co. ..... *
Crane Co. 88
Crane Packing Co. 202

D

Debothezat Fans Div., American Machine & Metals, Inc. 1
Deming Co. 186
Detroit Controls Corp. 173
Doerr Electric Corp. 62
Dravo Corp. .....Insert 41-44
Drayer-Hanson Div., National-U. S. Radiator Corp. 158
Dunham-Bush, Inc. 78-79
duPont, de Nemours, E. I. & Co., Inc. 207
Dwyer, F. W., Manufacturing Co. .. 152

E

Elgen Manufacturing Corp. ..... *
Elgo Shutter & Mfg. Co. ..... *

F

Fafnir Bearing Co. 159
Fairbanks Co. ..... *
Fairmount Aluminum Co. ..... *
Farr Co. 175
Farrar & Trefts Div., Adsco Industries, Inc. 205
Flexaust Corp. 160
Frick Company 201

G

General Electric Co. 191
Grinnell Co., Inc. ..... *
Gustin-Bacon Manufacturing Co. 32-33

H

Halstead & Mitchell 66
Harris, Arthur & Co. 152
Hartzell Propeller Fan Co. 195
Heating & Air-Conditioning Exposition 60
Heat-X, Inc. 182
Henry Valve Co. ..... *
Hoffman Specialty Manufacturing Corp. 74

I

Illinois Engineering Co. 81
Illinois Testing Laboratories, Inc. 202
Industrial Press ..... *
Infra Insulation, Inc. 7
Ingersoll-Rand Co. 37
Inland Steel Co. 46-47
Iron Fireman Manufacturing Co. ... 77

J

Jackson & Church 200
Jenkins Bros. 57
Jenn-Air Products Co., Inc. 56
Johnson Service Co. .....17-24, Back Cover
Josam Manufacturing Co. ..... *
Joy Manufacturing 48

K

King Zeero Co. ..... *
Koch Engineering Co. 152
Koppers Co., Inc. 61, 188
Kramer Trenton Co. 68
Kritzer Radiant Coils, Inc. ..... *
Kuhns Brothers Co. ..... *

L

Lawler Automatic Controls, Inc. ..... *
Lewin-Mathes 25

M

Magnetrol, Inc. ..... *
March Manufacturing Co. 204
Marley Co. ..... *
Marsh Heating Equipment Co. 14
McDonnell & Miller, Inc. 67
Modine Manufacturing Co. 90
Minneapolis-Honeywell Regulator Co. 26-29, 64-65

N

Nash Engineering Co. 92
National Tube Div., United States Steel Corp. ..... *
Nesbitt, John J., Inc. 11
New York Blower Co. 71
Niagara-Blower Co. 192
Norman Products 155

O

Olson, Arthur A., Co. 198

P

Patterson-Kelley Co., Inc. 13
Peerless of America 206
Peerless Electric Co. 76
Penn Ventilator Co. ..... *
Petro 73
Pittsburgh Plate Glass Co. 165
Power Line Fan Co. 180
Powers Regulator Co. 38-39
Prat-Daniel Corp., Thermobloc Div. .. *

Q

Quickdraft Co. 69

R

Reading Tube Corp. 153
Rempe Co. 204
Research Products Corp. 187
Reznor Manufacturing Co. 184
Richmond Engineering Co., Inc. 167
Rigidbilt, Inc. ..... *

S

Sarco Co., Inc. ..... *
Sarcotherm Controls, Inc. 169
Simplex Ceiling Corp. 194
Skidmore Corp. .....Insert bet. 68-69
Spence Engineering Co., Inc. 199
Sporlan Valve Co. 87
Spraying Systems Co. 204
Standard Stamping & Perforating Co. 181
Sturtevant Div., Westinghouse Electric Corp. 30-31
Superior Combustion Industries, Inc. 75
Synchronous Flame, Inc. 190

T

Thermobloc Div., Prat-Daniel Corp. .. *
Trane Co. 50-51
Tube Turns .....Insert bet. 60-61
Tuttle & Bailey, Inc. 52-53

U

United States Steel Corp., National Tube Div. ..... *
Universal Diffuser Corp. ..... *

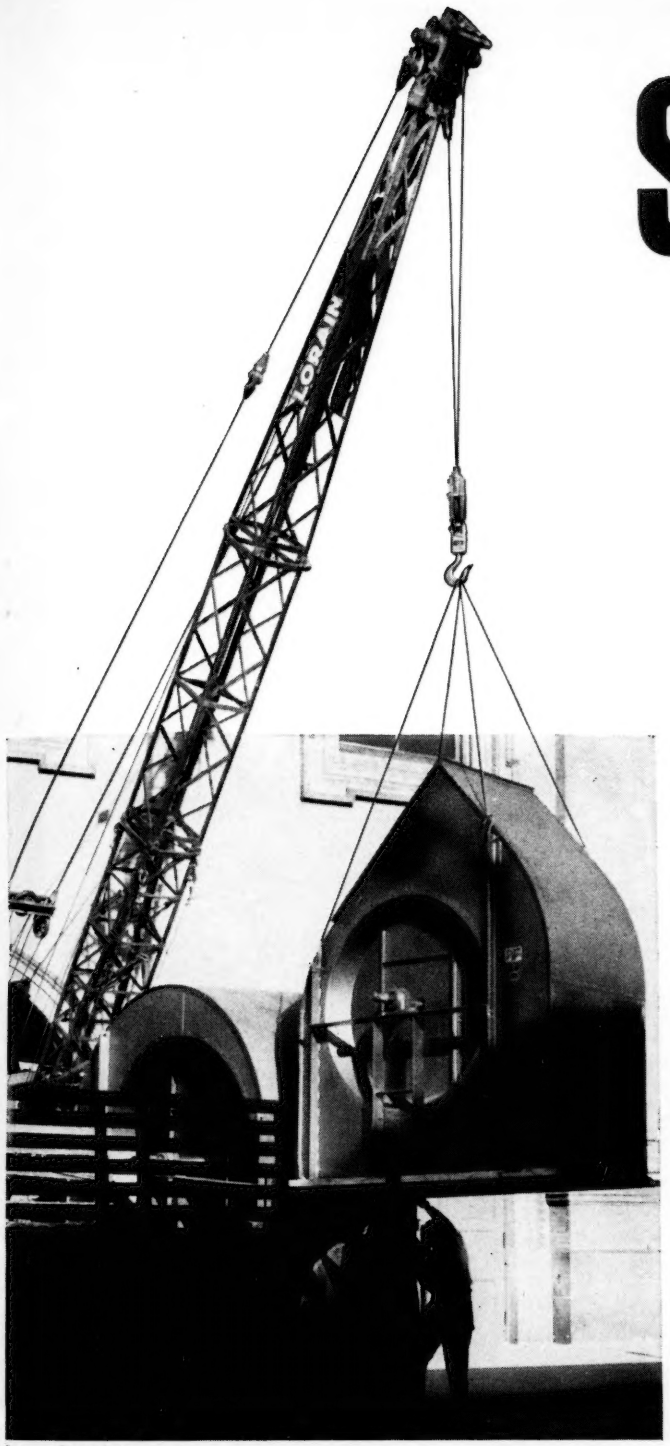
W

Wagner Electric Corp. 171
Walworth Corp. 185
Want Advertisements 207
Watts Regulator Co. 4
Webster, Warren & Co. 2
Weil-McLain Co. 183
Weil Pump Co. 205
Whitty Co., Inc. ..... *
Weigand, Edwin L., Co. 206
Weirton Steel Co., Div. National Steel Corp. 15
Westinghouse Electric Corp., Sturtevant Div. 30-31
Wing, L. J., Mfg. Co. ..... *
Worthington Corp. 203

Y

Yarnall-Waring Co. ..... *
Youngstown Sheet & Tube Co. 86

*ADVERTISER APPEARED IN PREVIOUS ISSUE.



Denver Post photo

Owner: City of Denver. **Architect:** G. Meredith Musick. **General Contractor:** Newstrom-Davis & Company. **Heating, Ventilating and Air Conditioning Contractor:** Trautman & Shreve, Inc. **Structural Engineer:** Phillips-Carter-Osborne, Inc.

SETTING THE STAGE

for a Better Breathing Denver Auditorium

Another ventilating assignment for Clarage. One of the features of the remodeled Denver City Auditorium is a new "respiratory system" using these Clarage Type HV Fans and a Clarage Type V Air Washer.

Here, as in so many other notable buildings the nation over, Clarage equipment was chosen for its recognized ability. Quiet . . . economical . . . and, most assuredly, dependable.

Make sure *your* investment in air handling and conditioning is a profitable one. Investigate the equipment we have perfected for every type of application. CLARAGE FAN COMPANY, Kalamazoo, Michigan.

CLARAGE ***. . . dependable equipment for making air your servant***

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

A New Idea in Radiant Heating with Temperature Control by Johnson

In what is reported to be the first application of its kind, planners of the University of Maryland's new Activities Building provided a radiant heating system designed to meet the special comfort requirements of spectators. Heat is delivered at floor level, beneath each of the arena's 12,000 fixed seats, by circulating hot water through pipe embedded in the concrete treads supporting the 26 rows of terraced seats.

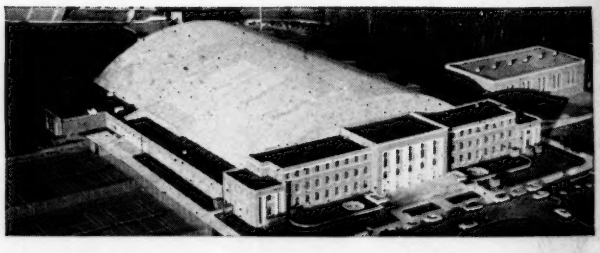
Successful operation of this unique system is accomplished by a specially engineered system of Johnson Automatic Temperature Control.

Each of the building's two radiant heating zones has its own convertor and circulator. Johnson Thermostats and Valves regulate the temperature of the hot water supply to insure consistent comfort throughout the arena. Johnson Master Thermostats, which compensate for changes in outdoor temperatures, anticipate the need for more or less heat and take corrective action *before* the need is felt inside.

The discomforts of cold floors and overheating are effectively eliminated, and occupants enjoy continuous comfort. Fuel is saved by matching the heat supply to outdoor temperatures.

Ventilation equipment for the arena, as well as numerous heating and ventilating units and unit ventilators serving the offices and other rooms, are also Johnson-controlled.

The unmatched comfort and economy features of Johnson Control are applied to all types of air conditioning, heating and ventilating systems. Why not discuss your control problems with a nearby engineer from the specialist Johnson organization? His recommendations are yours without obligation. Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in Principal Cities.



Activities Building, University of Maryland, College Park, Md. Hall, Boarder & Donaldson, architects, Baltimore; H. Walton Redmile & Associates, mechanical engineers, Washington, D. C.; Wm. H. Singleton Co., Inc., heating contractor, Arlington, Va.

JOHNSON CONTROL

SINCE 1885

PLANNING • MANUFACTURING • INSTALLING

t
r
-
n
et

all,
ci-
o.,

NG